THE FOUNDRY

POST-CONVENTION ISSUE

June, 1944

FIFTY-SECOND YEAR

Builders of the most complete line of power transmission machinery.

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Toronto 8.
Offices, Factory Branch Stores and distributors in principal cities.

Chicago Plants · Indianapolis Plant · Ordnance Plant · San Francisco

WHAT'S THE POSTWAR WORLD GOT THAT WE HAVEN'T GOT?

NO magic formula is going to produce a better postwar living standard . . . helicopters, television and push-button homes.

If these things are to come, they will be the result of a simple, unglamorous formula that gave us the miracle of American production—automobiles and razor blades, refrigerators and radios.

That formula is *Precision and Production—Volume and Economy.*

Originated in a free, competitive, peacetime economy, it has proved itself in war, for it was this formula which produced the miracle of America's war machine.

In the peace to come, when our task will be to build a better world, it will prove itself again.

Let not anyone forget it!

THE OSBORN MANUFACTURING COMPANY

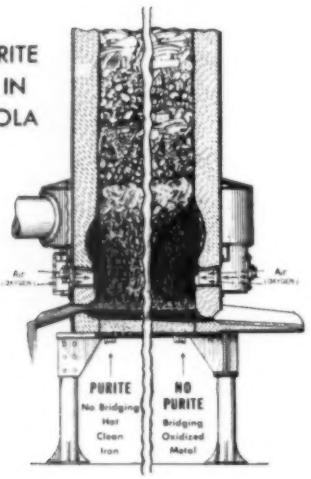
5401 Hamilton Avenue *Cleveland, Ohio*

OSBORN

MOULDING MACHINES

SPEED PRODUCTION OF SOUNDER CASTINGS

HOW PURITE WORKS IN THE CUPOLA



PURITE keeps the tuyeres open and bright during long heats and prevents bridging — gives a clean drop at the finish.

PURITE restricts the combustion zone to a smaller, hotter area in front of the tuyeres — prevents oxidation of the metal charge.

To insure sounder, better machining castings, use Purite

Refining with Purite, whether in the cupola or in a mixer ladle, removes inclusions, desulphurizes and helps prevent losses due to segregation of impurities.

Purite increases the fluidity and activity of the slag, speeds up combustion and reduces oxidation of the metal.

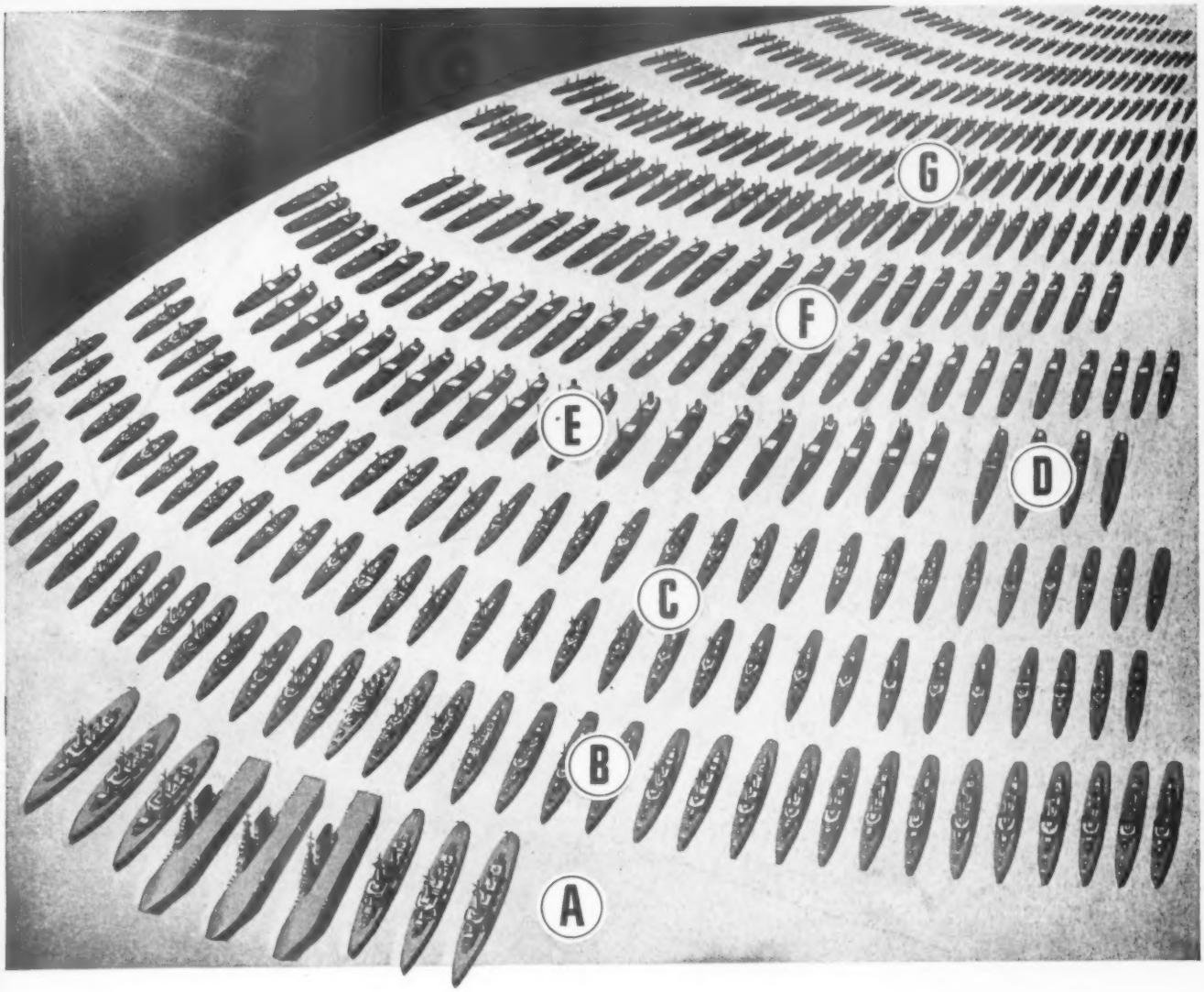
Purite pays real dividends in better cupola operations and cleaner, better casting metal.

THE SCIENTIFIC FLUX FOR BETTER MELTING AND CLEANER IRON

PURITE

THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42nd STREET, NEW YORK 17, N. Y.
(Licensee of Metallurgical Development Company, Inc.)

In Canada: Railway & Power Engineering Corporation, Limited



The Fleet that Bethlehem built in '43

380 FIGHTING AND CARGO SHIPS

These ships equivalent in value to 1000 Liberty ships.

- (A) 3 Aircraft Carriers and 6 Cruisers
- (B) 37 Destroyers
- (C) 64 Destroyer Escorts
- (D) 4 Cargo Ships
- (E) 20 Tankers
- (F) 54 Landing Ships
- (G) 192 Liberty Ships

WORLD'S LARGEST SHIPBUILDER BETHLEHEM STEEL SECOND LARGEST STEEL PRODUCER

The Ideal BENTONITE

- **FAST**
- **STRONG**
- **UNIFORM**

FAST—Green Bond is fast. It blends with sand so quickly that it's the ideal bentonite for use in today's high-speed mullers. Uniform grind makes it fast. For real speed, it's Federal Green Bond.

STRONG—Green Bond is strong. Careful selection and pre-testing of deposits—laboratory control of every processing step guarantees its strength when it reaches the foundry.

UNIFORM—You can establish your batch-mix with Green Bond permanently. Careful selection and processing by us ensure a contant, never-changing mix to you.

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SAY
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THE FOUNDRY

for JUNE 1944

VOLUME 72 NUMBER 6

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THE FOUNDRY is published monthly by THE PENTON PUBLISHING CO., Penton Building, 1213 West Third Street, Cleveland, O. EARL L. SHANER, President and Treasurer; GEORGE O. HAYS, Vice President and General Manager; RUSSELL C. JAENKE, Vice President; FRANK G. STEINEBACH, Vice President and Secretary, and EDITH L. WERNER, Assistant Treasurer.

Subscription: In the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $2.00; three years, $5.00. Single copies 25 cents. Copies published three months or more previous to date of current issue, 50 cents.

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Entered as second class matter at postoffice at Cleveland under the act of March 3, 1879.

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LESS GAS THAT'S WHY

AMPCO METAL, INC.

MILWAUKEE

USE LINOIL

THE saboteur, core gas, in your molds can be successfully attacked in two ways: (1) By using only core oil that is known to be a low gas producer; (2) By using an oil so strong that only a minimum amount of the oil is needed. Linoil meets both these specifications and it possesses a third that is equally important and has a direct bearing on the problem. That is, uniformity. The uniformity of Linoil means that you do not have to add an extra dash for insurance. With Linoil, work your oil to sand ratio down to the bedrock minimum required to make the core you need, and hold it right there. Depend upon it, what it does in the test it does in production.

THE WERNER G.

(DIVISION OF ARCHER-

2191 WEST 110 STREET WOODBINE

AND FEWER LOSSES

MANY PREFER LINOIL

"We find Werner G. Smith's Linoil satisfactory as we need only a minimum amount of oil to get a core that has strength enough to handle and yet will break down fairly fast. We also find that Linoil creates less gas than numerous other oils that we have tried."— Ampco Metal, Inc.

LINOIL

(A) The strength of Linoil. Strength for handling, strength to resist the heat, weight, and erosive action of the pour. (B) The endurance to hold its ground until the metal sets. (C) The rapid breakdown of the Linoil core immediately after the metal sets; and its easy, quick, shake-out from the casting. (D) Linoil's speed in drying, increasing oven output. (E) Linoil's speed in the mixer or muller, rapid and thorough coating of each grain with thin film of oil. (F) Clean on core bench—does not stick to boxes, does not air-dry, coremakers like Linoil. (G) Absolute uniformity year in, year out.

WORK IN BRONZE

l. h. page: Core of a bronze pump body. r. h. page, top: Core for protective cover for marine engine. bottom: Core for protective cover for propeller blades.

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DANIELS-MIDLAND COMPANY)

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HYDRO CORE-KNOCKOUT

SANITARY WARE CLEANING

"AIR" OR "ROTOBLAST"

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World's Largest Manufacturer of Blast

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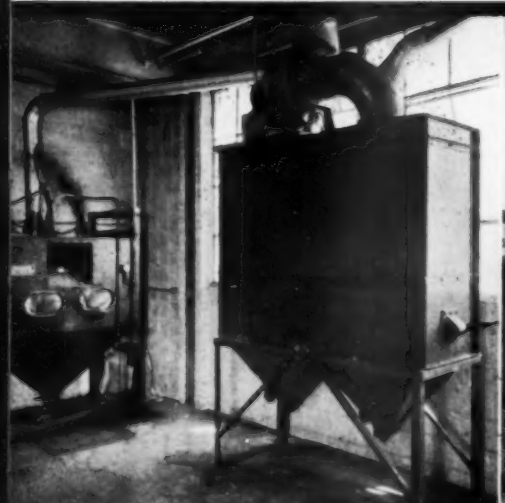
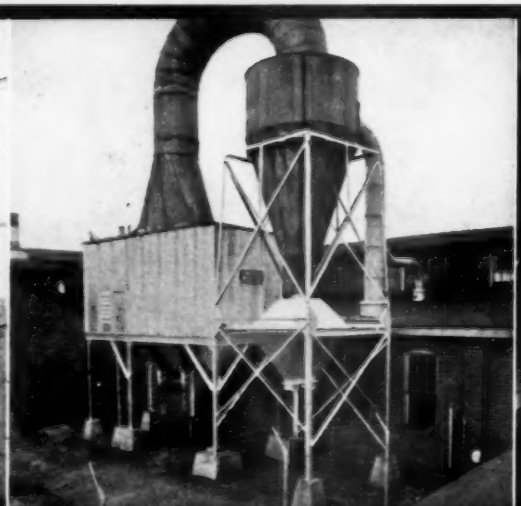
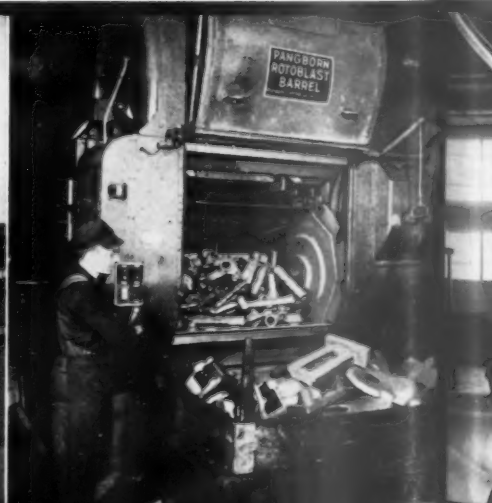


AIR BLAST CABINET

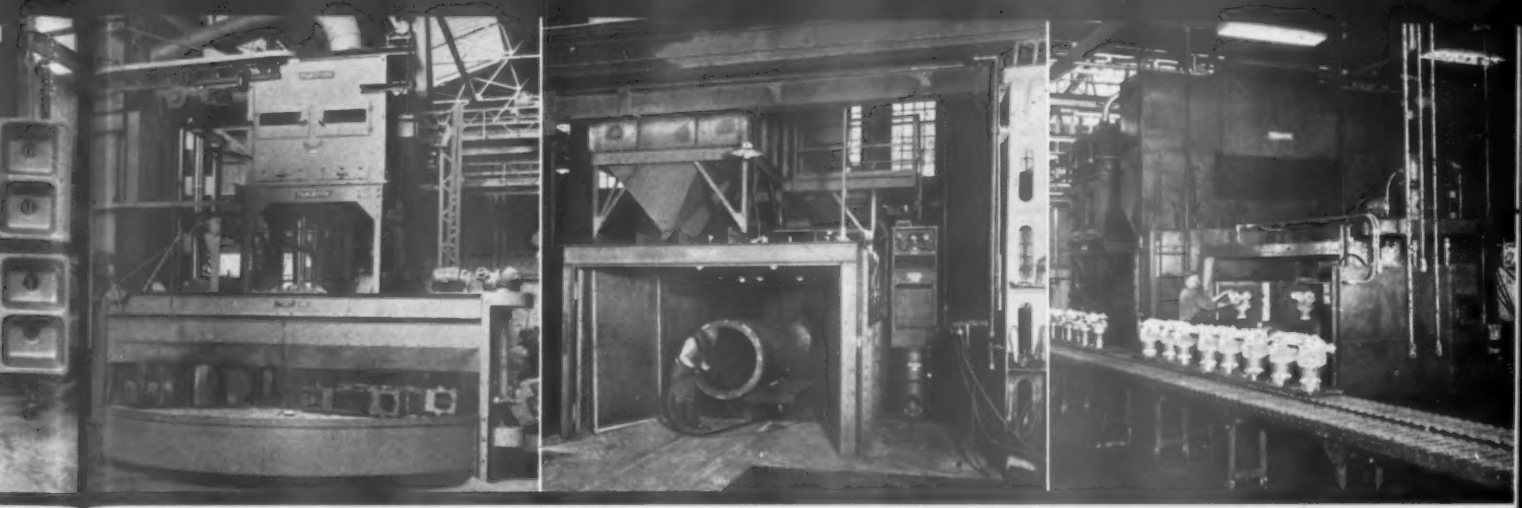


DUST COLLECTOR



ROTOBLAST BARREL

AUT



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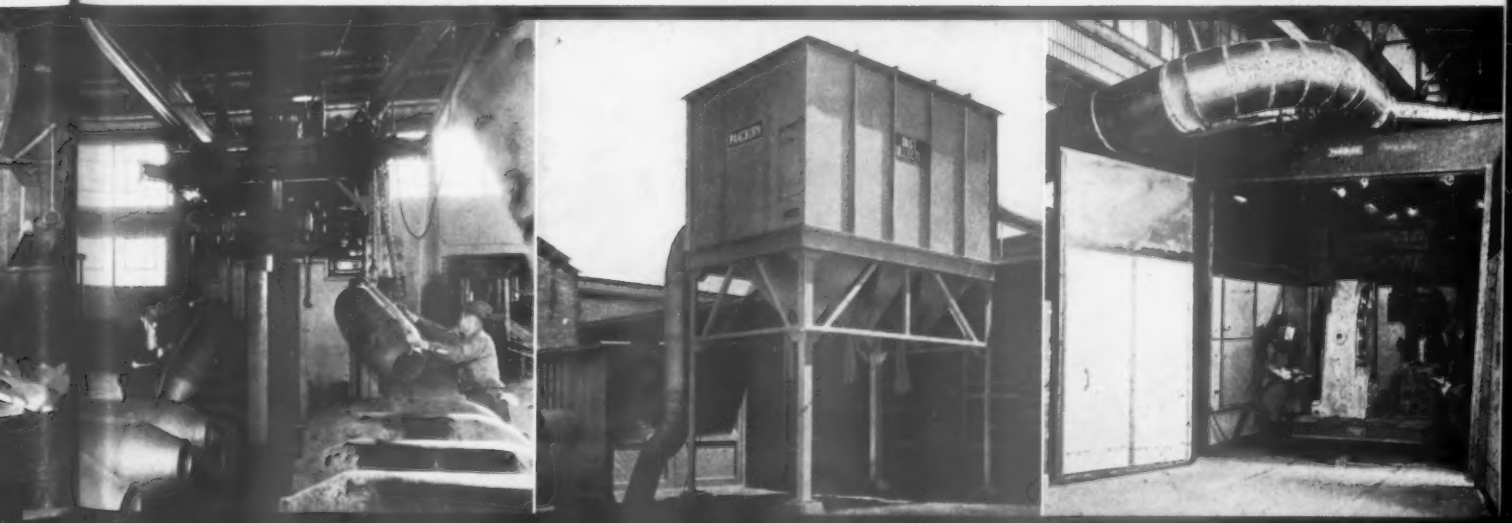
ARMY NAVY

For excellence in production

AUTOMATIC BOMB CLEANING | DUST COLLECTOR | AIR BLAST ROOM



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Shop Equipment
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Run Work
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Circular Shapes
Box or Rod Turning
Built-up Work
Reinforcements
Using Gypsum in Molds
Parting Compounds
Types of Gypsum Cements
Shop Layout
Mixer Design

1 Are molds required for gypsum cement patterns? Absolutely not! Picture pages explain the "period of plasticity," and how it can be used to make better patterns more quickly and more easily.

2 Is expensive equipment required? No! Very simple tools and equipment can be used to produce a wide variety of shapes and sizes. The manual tells what is needed.

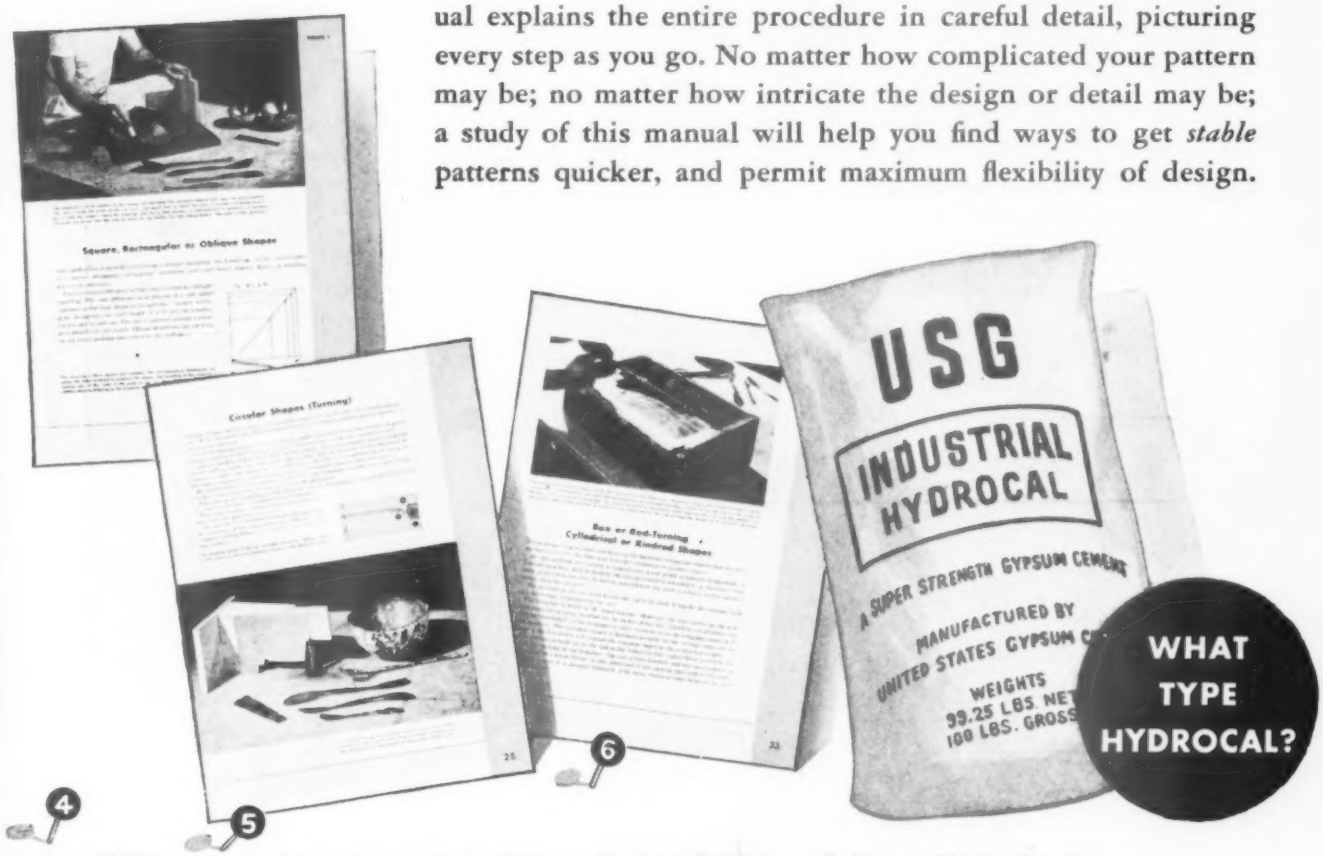
3 What special skills are required to make gypsum cement patterns? None! Any good craftsman can quickly master the procedure, from the making of templates to shaping and finishing.

THE YEAR!

FIRST OF ITS KIND EVER PUBLISHED

COMPLETE STEP-BY-STEP STORY OF A NEWER, BETTER WAY TO MAKE PATTERNS

Now any pattern shop can take advantage of the speed and accuracy that gypsum cement makes possible. This new manual explains the entire procedure in careful detail, picturing every step as you go. No matter how complicated your pattern may be; no matter how intricate the design or detail may be; a study of this manual will help you find ways to get *stable* patterns quicker, and permit maximum flexibility of design.



Similar methods are used to make square, oblique or rectangular shapes, and with any contour.

Circular shapes such as wheels, discs and housings are quickly produced. The manual shows how. Described in detail, step-by-step.

Turning a cylindrical pattern on a rod with mounted template is clearly described.

Basic types of Hydrocal* gypsum cements, and their physical characteristics are shown on pages 45-46.

*Trademark Reg. U. S. Pat. Off.

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Dept. F 6-44, Chicago 6, Illinois

Gentlemen: Please send me a copy of your new manual on "How to Make Patterns and Models with Gypsum Cement."

Name.....

Street.....

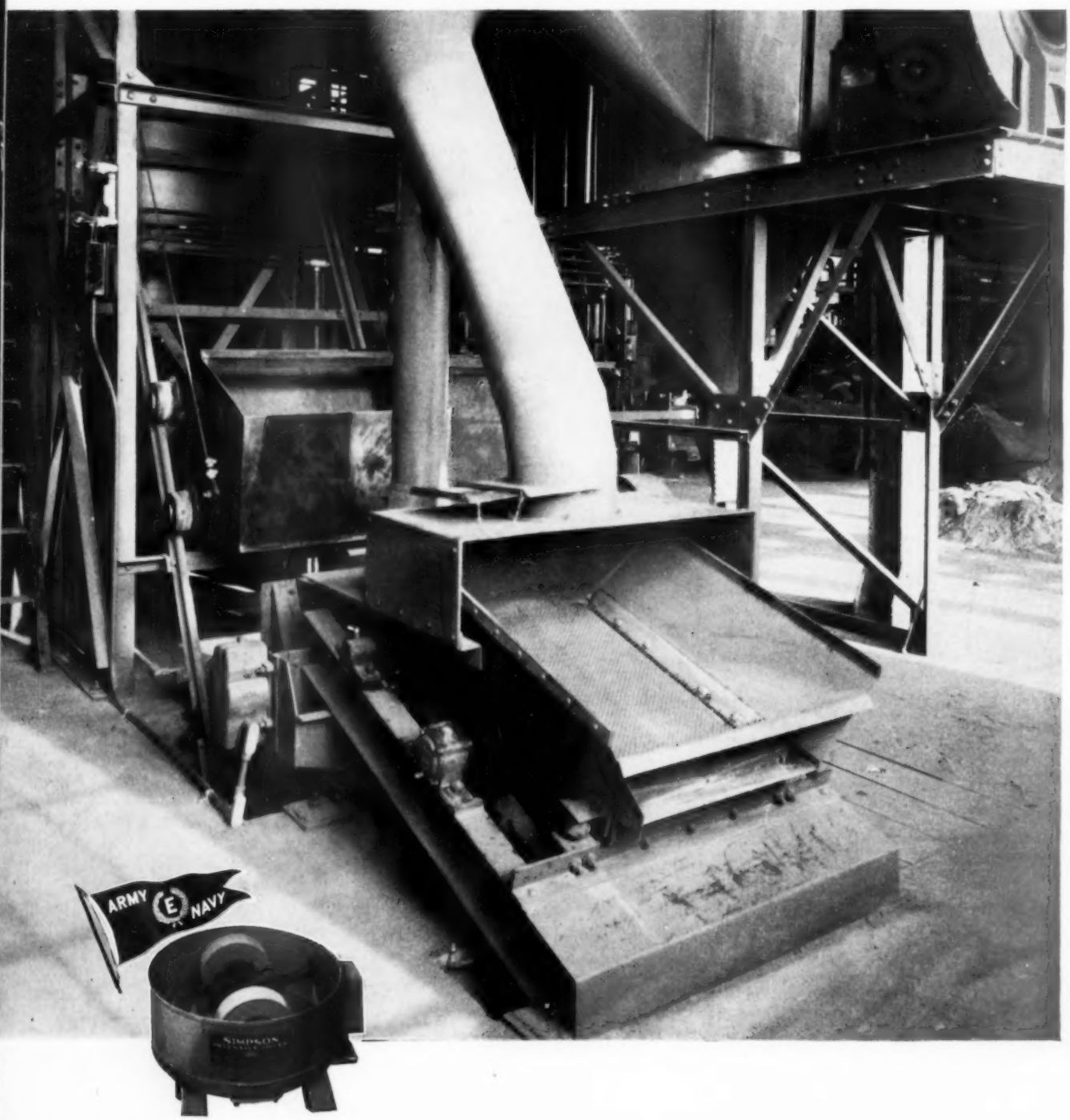
City.....*State*.....

NATIONAL EQUIPMENT

NATIONAL SCREENING and MAGNETIC SEPARATOR UNIT

★ Modern sand control demands ***clean*** sand as well as properly mulled sand. That is why National has developed the compact and efficient National Screening and Magnetic Separator Unit. It is designed to operate in close conjunction with a Simpson Mixer and other National equipment.

In using the National Screening and Magnetic Separator Unit you are assured of thoroughly clean sand and all the advantages it offers for producing cleaner castings at lower cost. Read the "advantages" at the right and then ask a National Engineer to discuss the details with you.



. . for better sand control

Left:
National Unit discharging automatically into a bucket loader for charge into a Simpson Mixer. All metallic refuse has been eliminated — sand is clean.

Right:
Used shakeout sand charging onto screen which will screen-out all lumps. Simpson Mixer receiving this cleaned, screened sand will do its most efficient mulling job.

Advantages

1 The National Screening and Magnetic Separator Unit screens the sand for lumps, separates metallic refuse, controls fines and delivers sand continuously or intermittently to a National Bucket Loader for charging into the Simpson Mixer.

2 Sand is shoveled onto the vibrating screen or delivered into a hopper and then down to the screen where it shakes through onto a conveyor belt, passes over a magnetic pulley (which removes scrap) and then is discharged into the National Bucket loader without handling.

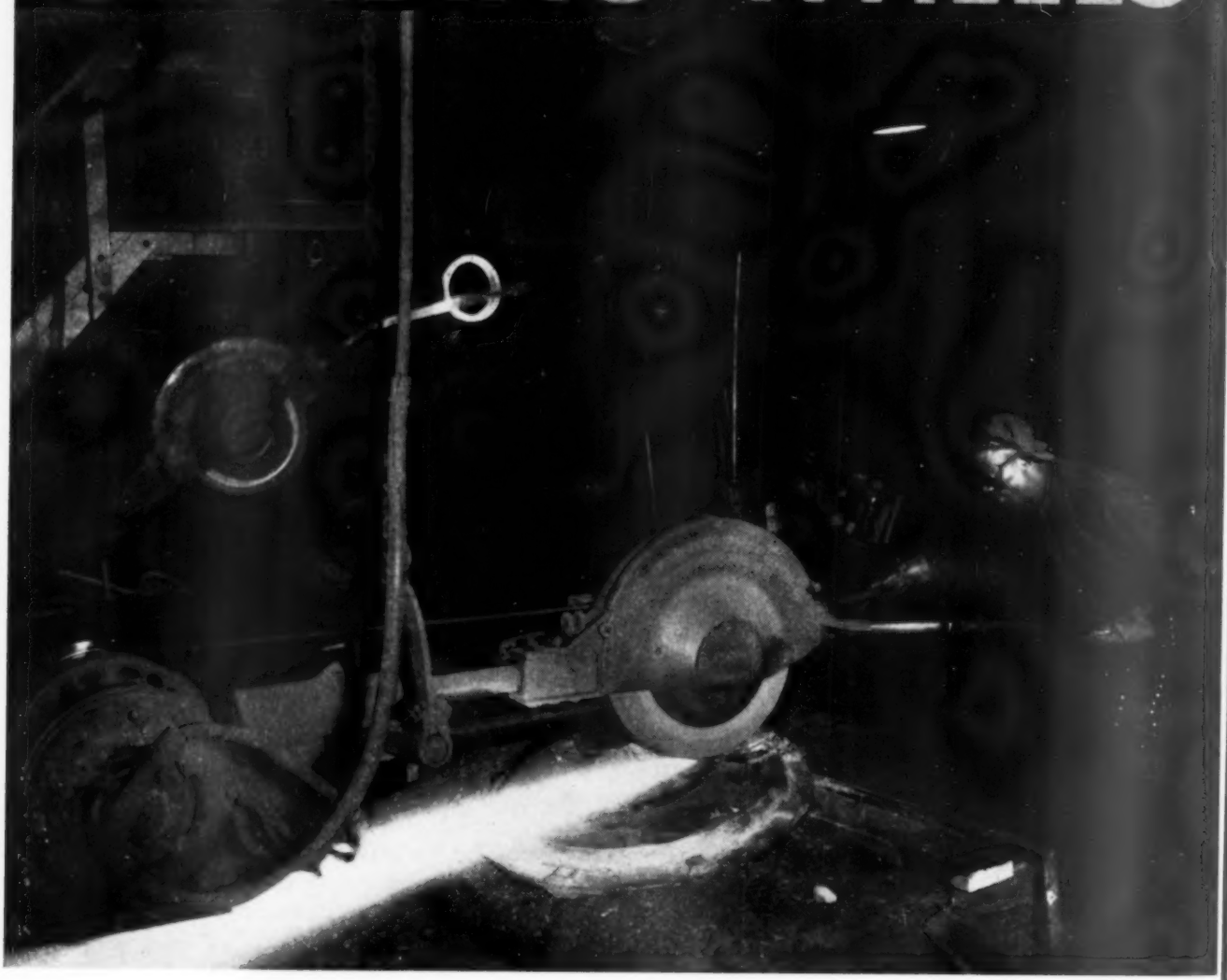
3 Construction is rugged to withstand the heavy duty service required in modern foundry practice. The vibrating screen is actuated by a powerful eccentric. which undergoes a 48 hour test run before assembly. The magnetic pulley, which operates on direct current, is manufactured by an outstanding builder of such equipment. All bearings are sealed, anti-friction.

4 The unit is supplied with a partial hood which eliminates dust and controls fines. Complete hood enclosure and exhaust is available when desired.

National Engineering Service
National Field Service
For more than 30 years National Engineering and Field Service, has helped hundreds of foundries solve problems in sand preparation, reclamation, handling, storage and control. Today, National Engineers are constantly on the job helping foundries with problems of sand handling and control on construction, maintenance, repair or new requirements. National Engineering and Field Service is available and eager to help you whenever and wherever you need it.
NATIONAL ENGINEERING COMPANY
MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries:—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co.. Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, B[illegible]e & Co., Pty., Ltd. Sydney, Australia

MACKLIN
GRINDING WHEELS



FOUNDRIES, large and small, require grinding wheels in many sizes, shapes, grains and grade combinations.

Macklin Company is thoroughly equipped to produce high quality grinding wheels for all foundry requirements.

No matter what your grinding problems may be there is a Macklin wheel to fit the job that will "Protect Your Production."

Ask for the services of a Macklin Field Engineer.

Invest in War Bonds

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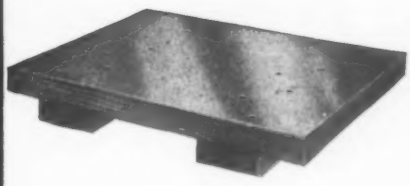
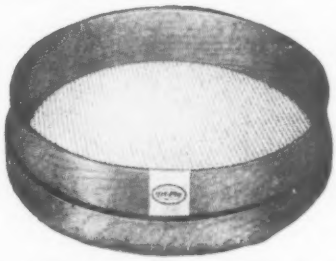
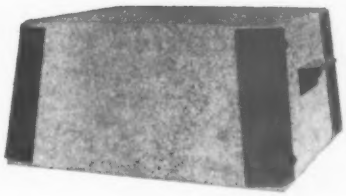


CMD FIRE-RESISTANT BOTTOM BOARDS

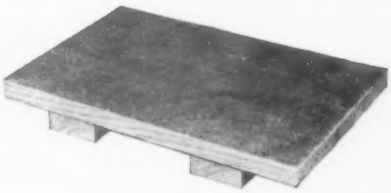
CMD WOOD FLOOR FLASKS



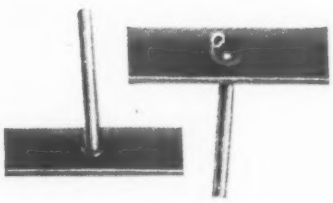
TRI-PLY FOUNDRY RIDDLE



CMD NON-WARP, NON-BURN COMPOSITION JACKET



CMD WOOD BOTTOM BOARD



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Combination drift and chisel

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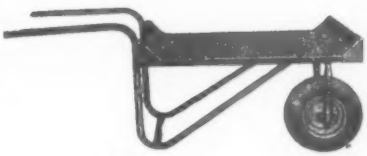
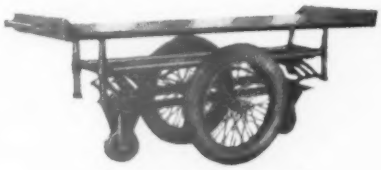


CMD PNEUMATIC CORE BARROWS
With single wheel (as shown here) or two wheels



CMD PNEUMATIC CORE TRUCKS
Minimize core chafing and breakage

Foundries have been relying on CMD for time-saving, labor-saving supplies and equipment for 23 years. Write now for catalog on the complete CMD line!

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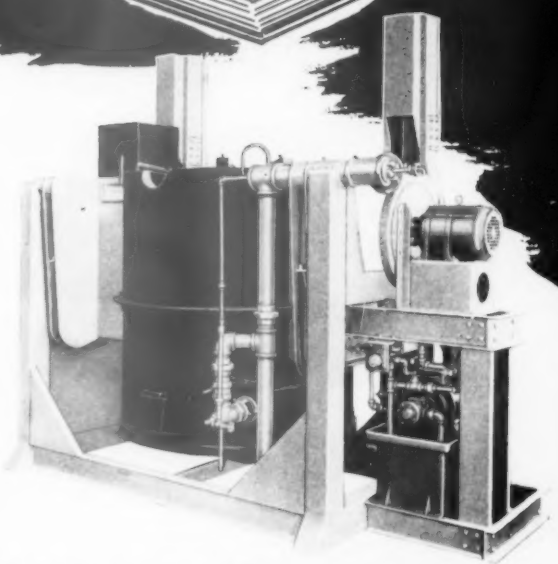

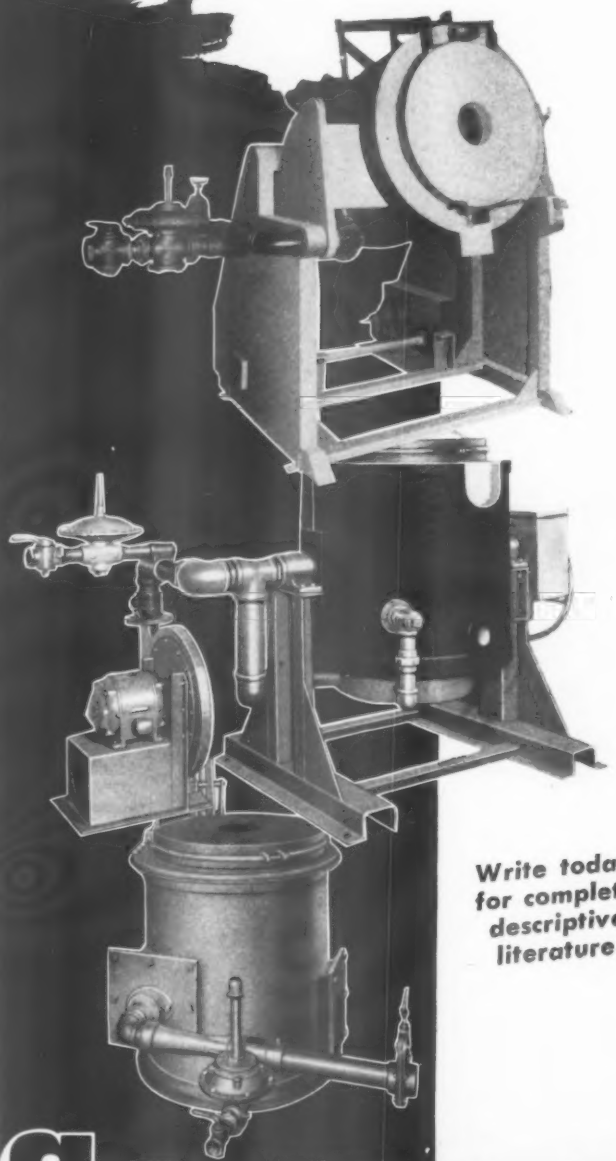

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STROMAN HYDRAULIC TILTING FURNACES *FOR ALUMINUM AND MAGNESIUM*

Displayed at the Buffalo Foundry Congress. Combines Hydraulic Tilt for smoothest operation . . . Stationary Lip Pour for speed, as ladle does not have to be moved during entire pour . . . Variable Speed Pour controls tilting speed as desired by operator. Fired by gas or oil. Capacities: All sizes up to 2000 lbs. Magnesium, or 3000 lbs. Aluminum.

STROMAN MECHANICAL TILT CRUCIBLE FURNACES *FOR BRASS AND ALUMINUM*

Compact, sturdy and lasting, these furnaces also embody the famous Stationary Lip Pour. Mechanical Tilt is finger-tip controlled. Push-back cover is easiest to operate. Oil or gas fire.

STROMAN MANUAL TILTING FURNACES *FOR BRASS, BRONZE AND ALUMINUM*

Also displayed at the Buffalo Foundry Congress. Streamlined to remove old style massiveness, but as sturdy as ever. New gearing system makes hand wheel tilt easier than ever to operate. Swing cover can be easily moved for charging. Oil or gas fire. All sizes from 40 to 400 crucible.

STROMAN STATIONARY FURNACES *FOR BRASS, BRONZE, ALUMINUM AND OTHER ALLOYS, GAS OR OIL FIRED*

(Illustration shows Gas Fired Furnace)

These greatly advanced furnaces are equipped with proportional mixers which automatically control the ratio of gas and air to the burner and keep the correct proportions accurate at all times. This assures the maintenance of a correct furnace atmosphere so necessary in the melting of brass and aluminum alloys. Capacities: 20 to 400 crucible.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

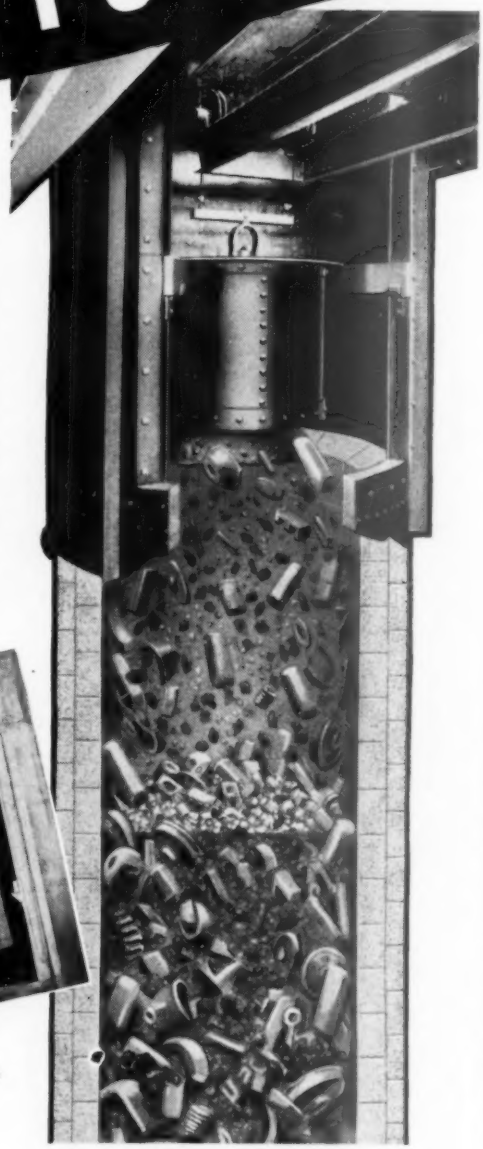
THE PETERSEN OVEN CO. 300 W. ADAMS ST. CHICAGO 6

Save Manpower and Materials with

MECHANICAL

HOW THE WISHBONE SYSTEM of charging with cone-bottom buckets gives controlled, uniform distribution

By lowering the cone bottom slowly, the charge is allowed to dribble out, resulting in a tighter charge around the edge and a more open charge in the center. This permits better penetration of the blast, faster melting, and more uniform combustion across the entire cupola area.



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SIXTY YEARS OF SERVICE
TO THE FOUNDRY INDUSTRY

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, and Washington, D. C. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario.

WHITING
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CHARGING

Whiting Charging Systems

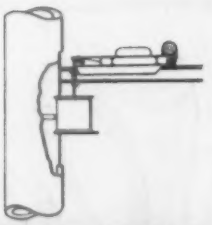
. . . are tailor-made to fit the individual needs of small or large foundries . . . they cover every step from yard to cupola.

Mechanical charging has brought these results for others —it can do the same for you:

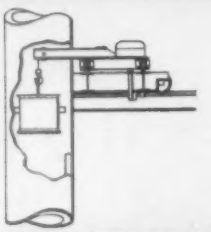
1. Reduces manpower requirements and labor costs
2. Does away with hand lifting of heavy, dirty materials
3. Improves working conditions—reduces worker hazards
4. Provides a smooth flow of materials, with accurate proportioning
5. Saves fuel, reducing the cost per ton of hot metal

Important as OPERATING EFFICIENCY is today, it will be vital to concerns that wish to survive in post-war competition. Now is the time to re-align production operations in the most efficient manner possible.

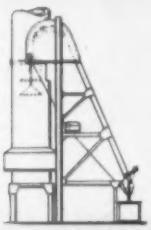
Whiting will be glad to discuss your problems and give you the advantage of its more than sixty years' experience in foundry operation as the leading supplier of foundry equipment. Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.



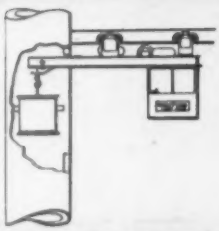
Horseshoe—Wishbone



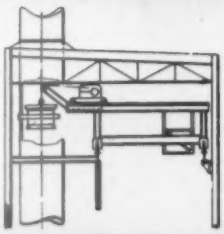
Overhung—Wishbone



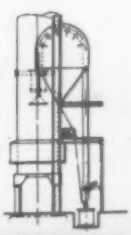
Inclined Skip—Wishbone



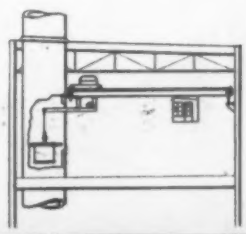
Monorail—Wishbone



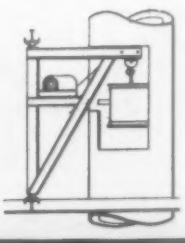
Underslung—Wishbone



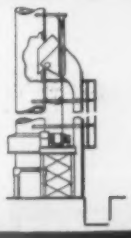
Vertical Skip—Wishbone



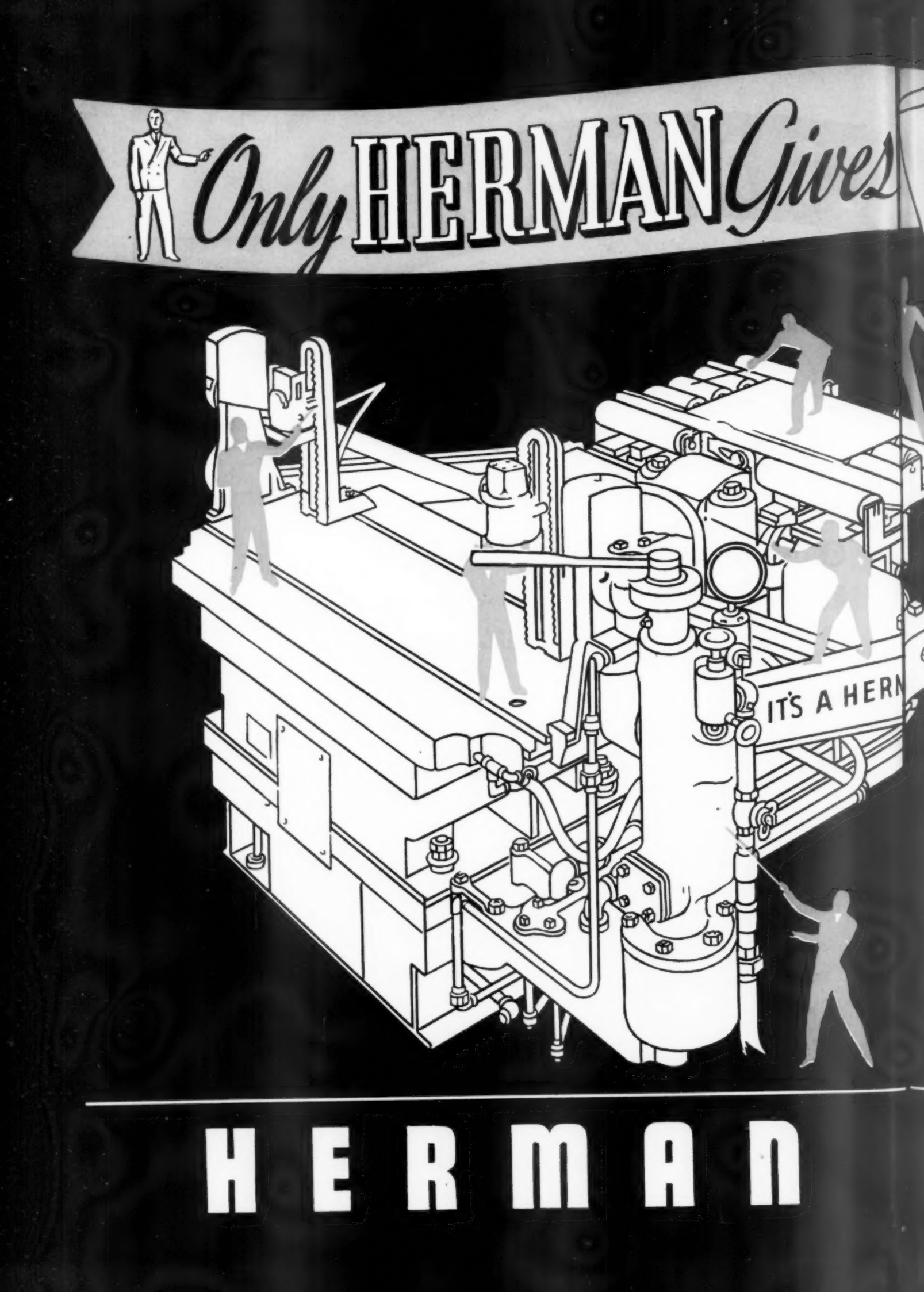
Gantry Crane—Wishbone



Jib Crane—Wishbone



Skip Hoist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IT'S A HERM
HERMAN

You All these Features

ONLY HERMAN GIVES YOU ALL THESE FEATURES

- ★ Designed and built by engineers specializing in the manufacture of Molding Machines only.
- ★ Automatic Timing Device for jarring and rapid, rotary valve control for rollover and pattern draw.
- ★ Air Clamps instantaneous in action, adjustable to different sizes and heights of flasks.
- ★ Smooth, steady hydraulic action for rollover and pattern draw.
- ★ Pattern draw equalizer automatically locks after adjusting itself to irregularities of flask. Assures accurate draws.
- ★ Mold makes complete 180 degree turn while roll-over arm has raised only 90 degrees. Saves power, cuts molding time.
- ★ Gravity return of rollover plate. Saves power.
- ★ Mold deposited directly on roller conveyor. No lifts necessary.
- ★ Built to produce better molds in less time.

HERMAN PNEUMATIC MACHINE CO.
UNION BANK BUILDING
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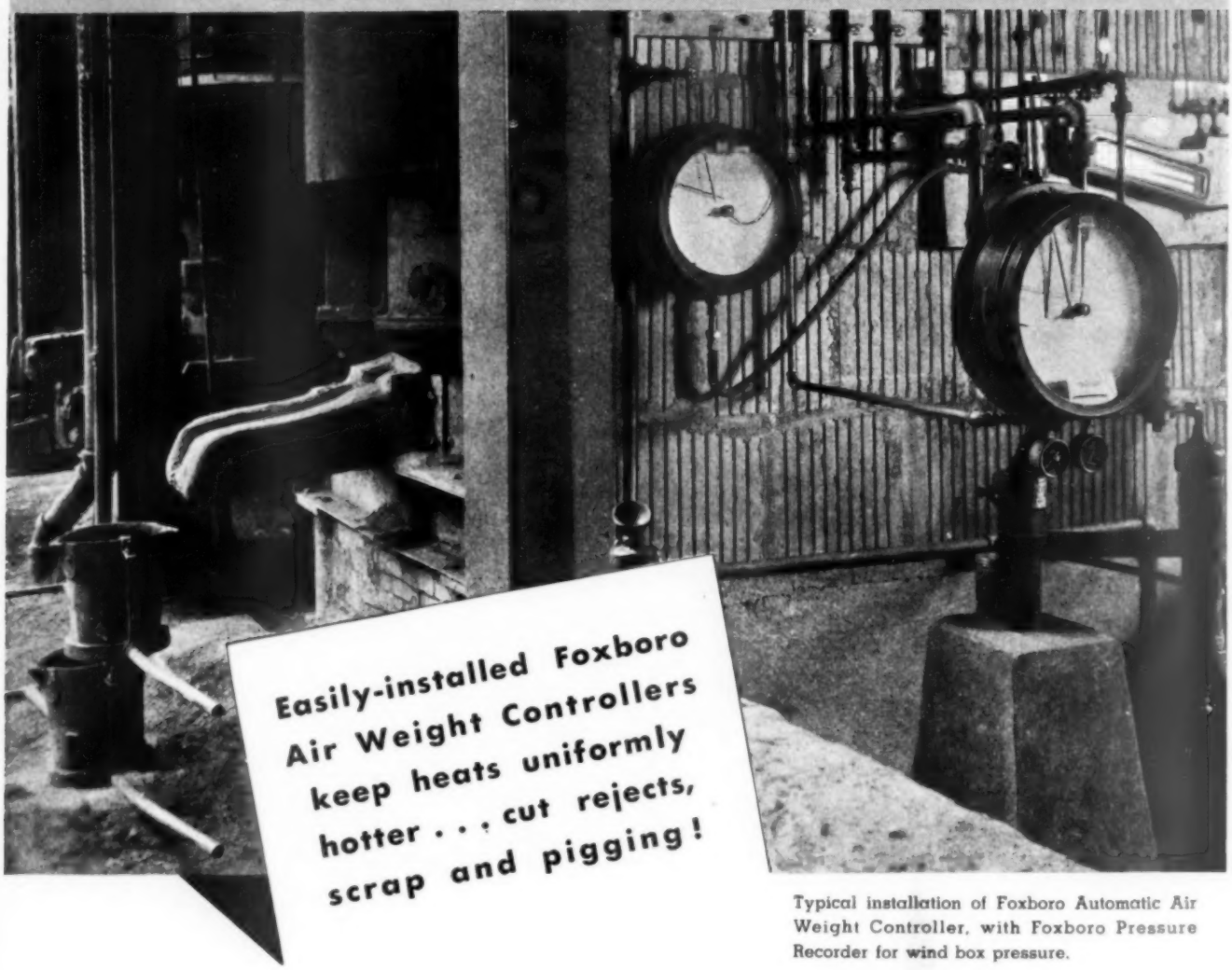
MOLDING MACHINES

SPEEDIEST SHORT-CUT

to Higher, Better Foundry Output!



Typical installation of Foxboro Automatic Air Weight Controller, with Foxboro Pressure Recorder for wind box pressure.

Here's a simple accessory installation for cupolas that is helping foundrymen step-up their capacity, save waste and improve quality of output. It's the Foxboro Air Weight Controller . . . a precision automatic instrument that exactly controls the supply of air *by weight*, regardless of changing atmospheric temperature or pressure!

Immediate, permanent benefits include: uniformly hotter iron, without burning; higher quality castings; fewer rejects; and elimination of pigging. Operation is completely automatic, too. All you do is set the control pointer on the Foxboro Air Weight Controller at the desired rate of flow, before you start the run. No further attention is necessary.

Air Weight Controllers are one of Foxboro's many original developments in instrumentation to cut industrial costs through better production. You can verify their performance by talking with users in your vicinity. (Names supplied on request).

Write for Bulletin B-268 on Foxboro Air Weight Controllers, or detailed information on any other type of instrumentation you need. **The Foxboro Company, 32 Neponset Ave., Foxboro, Mass., U.S.A.** Also Montreal, Canada. Branches in principal cities.

RECORDING · CONTROLLING · INDICATING

FOXBORO
REG. U. S. PAT. OFF.
Instruments

Each Ton of Grinding Balls Grinds More Ore When Chromium Alloy Grinding Balls are Used

Chromium in small percentages (1 to 3 per cent) in iron or steel grinding balls for ball mills gives these balls greatly increased life. The moderate increase in the cost of the chromium addition is saved many times over in the increased tonnage of ore ground for each ton of grinding balls used.

Chromium hardens and toughens the iron deep into the core of the ball, which increases wear resistance and length of service.

The same wear resistance that gives low-chromium alloy grinding balls their long life is useful also in many other mining and milling operations. Low-chromium alloy irons are being successfully used in ball mill liners, pumps, cable hoist brake rings and drums, gears, cylinder liners, and stoker and furnace parts.

For information on how to make and use chromium alloy irons, write for the booklet, "Chromium in Cast Iron".

* * *

We do not make iron or steel, but we do produce EM Chromium Briquets, Electromet Foundry Grade Ferrochrome, and other Electromet alloys for foundries and steel plants. Our metallurgists have a background of more than 37 years experience with alloy cast irons and steels, both in the laboratory and in the field. Call on us if you have a problem on the melting or use of alloy irons and steels.

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WAR BONDS AND STAMPS

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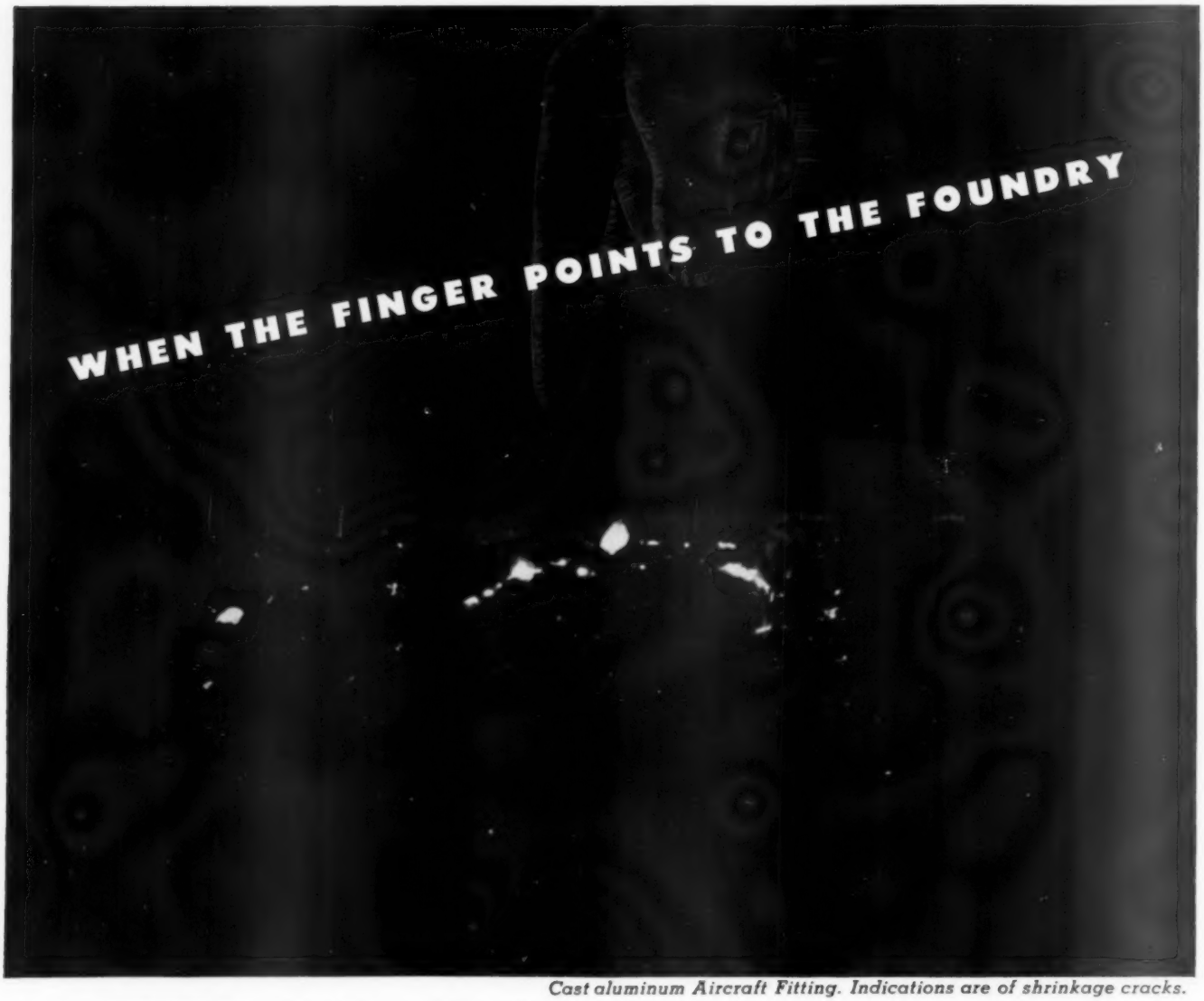

Cast aluminum Aircraft Fitting. Indications are of shrinkage cracks.

ZYGLO* BLACK LIGHT METHOD

Unerringly Reveals Surface Defects . . . Permits Inspection of Every Part

Alert foundrymen no longer trust random inspection of 1 out of every 100 castings. That is too risky in these days of precision production. No one knows how many of the other 99 uninspected castings may have flaws.

With this method, *every* casting gets a quick thorough inspection. The ZYGLO Method is being effectively used on all metals, non-magnetic, and magnetic—particulary on aluminum and magnesium to find shrinkage cracks, hot tears, cold shuts, etc.

ZYGLO'S brilliant fluorescent indicatons allow the rejection of parts susceptible to failure. Often it is the means of correcting production operations to eliminate similar flaws in the future.

Write for illustrated ZYGLO Bulletin and full information about the ZYGLO Black Light Method.

• • •

*ZYGLO . . . the Trade Mark of Magnaflux Corporation applied to its equipment, material and methods for fluorescent penetrant inspection.

MAGNAFLUX CORPORATION

MAGNAFLUX CORPORATION

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NEW YORK • DETROIT • DALLAS • LOS ANGELES • CLEVELAND • BIRMINGHAM

Thor BANTAM ROTARY AIR GRINDERS

A HANDFUL OF POWER FOR HUNDREDS OF JOBS

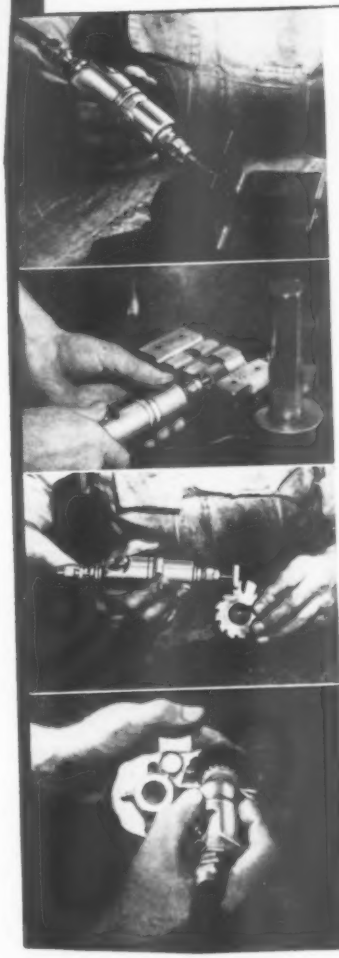
For All Small-Wheel Work

The new Thor "Bantam" Rotary Air Grinders are the ideal small-wheel grinders for shop, laboratory, or work bench. They handle all accessories; work in practically every material. Have the right speeds and power for grinding with abrasive wheels and points; for cutting with rotary files; routing with steel cutters; polishing with felt and soft rubber polishers; cleaning with wire brushes; and for sanding.

SMALL · LIGHT · POWERFUL

The small size and light weight of Thor "Bantam" Rotary Air Grinders provide perfect one-hand operation. They handle easily as a pencil for accuracy on precision work; yet their power and sturdy construction assure continuous and efficient performance on hard jobs.

Thor Rotary Air Grinders of the "Bantam" type are available in speeds from 7,000 to 21,000 R.P.M.; in weights from 20 ounces to 5 1/16 pounds; in lengths from 6 3/8 inches to 15 inches.



• SMALL-WHEEL GRINDING
Mounted abrasive points and wheels up to 2" diameter can be used in Thor "Bantam" type Air Grinders. Wheels are available in a wide range of sizes and grains for grinding all materials. Designed to fit the hand, the Thor "Bantams" provide perfect control, "finger-point" accuracy and dependable power for hundreds of jobs.

• CUTTING AND ENGRAVING
Because the Thor "Bantams" handle as easily as a pencil they are ideal for use with rotary files and steel cutters. Precision cutting, carving, beveling, routing and roughing in wood, plastics and metals is done rapidly and efficiently in minutes where formerly hours were required.

• POLISHING AND BUFFING
Superlative finishes on practically all materials are obtained by Thor "Bantams" when used with soft felt and soft rubber wheels. Hours of hard labor are saved and finer results are obtained with these fast, convenient tools.

• CLEANING AND SANDING
Cleaning, removing rust, and many other wire brush jobs are done faster and better with versatile Thor "Bantams."

Sanding discs and drum sanders used with Thor "Bantams" for use on wood or metal save much handwork.

Steel saws and rubber cutting discs for high speed operation with Thor "Bantams" cut light materials with lightning speed.

THOR AIR GRINDERS OFFER THESE ADVANTAGES

"Finger-Point" Accuracy—Thor "Bantam" Grinders fit perfectly in one hand . . . handle as easily as a pencil . . . provide "finger-point" accuracy.

Dependable Power—Thor one-piece rotor is perfectly balanced to revolve without vibration. Multiple blade construction insures quick action and instant starting under load.

Longer Life—Alloy-steel housings are die-cast for strength and long-lasting, continuous service.

These, and such other features as automatic lubrication, positive-lock of throttle for assured continuous operation and on some models, free rotation into any position with a swivel hose connection, are available in the *complete* line of Thor "Bantam" Type Air Grinders.

000H GRINDER — 00H GRINDER — 10 GRINDER

	000H	000	00D	00H	10-18	10-15	10-10
WHEEL (Vitrified) CAP. (Bonded)	1¼"x½"	1½"x½"	1¼"x½" 1½"x½"	1½"x⅝" 2"x½"	1½"x½" 2"x½"	1½"x½" 2½"x½"	2"x½" 3"x½"
SPEED (r.p.m.)	20,000	14,000	21,000	17,000	18,000	15,000	10,500
WEIGHT	22 ozs.	20 ozs.	3-3/16 lbs.	5-1/16 lbs.	4⅛ lbs.	4⅛ lbs.	4⅛ lbs.
LENGTH	6⅜"	6¾"	9½"	13⅜"	15"	15"	15"

Learn today how Thor "Bantam" Air Grinders can save you time and money on hundreds of jobs. Write for Thor Catalog 52-B.

Thor *Portable Pneumatic and Electric Tools*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. JACKSON BOULEVARD CHICAGO 6, ILL.

Branches in Principal Cities

EVERY SQUARE FOOT of Oven Floorspace Produces 956 lbs. of Cores Per Day!

How Despatch Engineers Solved an Unusual Corebaking Problem

"Here," said foundry executives to Despatch engineers, "is the core output we need . . . here's the way we'd like to run our production line . . . and this is all the floorspace we have for ovens. What can you do about it?"

The answer is shown here: a battery of Despatch conveyor ovens, each occupying an average floorspace of 12¾ by 11½ feet. Their daily corebaking output is 432,000 lbs. (216 tons) . . . or *956 lbs. of cores per day for every square foot of oven floorspace!*

Load and Unload at Different Levels

These Despatch ovens (two 74 ft. high and one 54 ft. high) set into a mezzanine floor 24 ft. above main floor level. Coremakers work on the upper floor and load directly into oven.

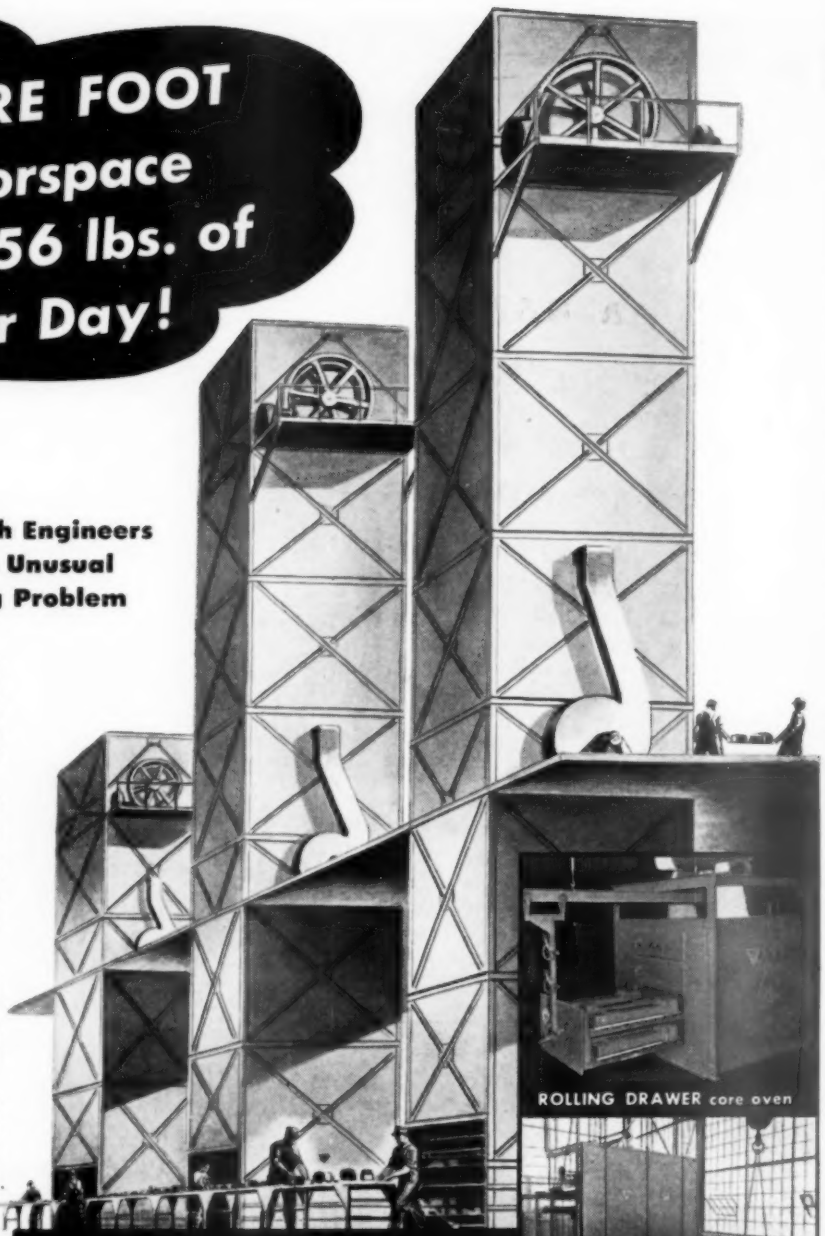
Cores are carried upward through work chamber and bake rapidly in a smooth-flowing uniform bath of properly heated recirculated air. On downward trip, cores complete baking and then enter cooling chamber. They are unloaded on main floor.

When to Use Conveyor Ovens

This installation is a good example of *when* Despatch conveyor ovens can be used to best advantage: for maximum production of cores whose baking times are comparable.

Have You a Core Baking Problem?

When you have a core-baking problem, call on Despatch for prompt, competent attention. One of the many types of Despatch ovens will suit your foundry best. *Phone, write or wire today!*



ADVANTAGES OF DESPATCH CONVEYOR OVENS

1. **It gives you maximum production** by providing continuous baking; no interruption between loads.
2. **Makes best use of space** as Despatch ovens are fitted to individual foundry requirements.
3. **Straightens production lines** with "straight-line" handling from coremakers thru oven to molds.
4. **Saves labor** by using the manpower more effectively. Greatly increases core output-per-man.
5. **Built for hard use** with extra-heavy construction over all. Requires minimum maintenance.
6. **Economical to operate.** Recirculates up to 75% of heated air. Efficient gas or oil firing.

ROLLING DRAWER core oven

CAR-LOADED Despatch oven

RACK TYPE Despatch core oven

HORIZONTAL conveyor core oven

DESPATCH
OVEN COMPANY MINNEAPOLIS

SAMUEL GREENFIELD CO., INC., SMELTERS and REFINERS

THANKS FOR THE MEMORIES

Greenfield exhibit at the 3rd War Production Foundry Convention.

NOW that the curtain has been rung down on another successful American Foundrymen's Convention - The Samuel Greenfield Company, Inc.- extends hearty congratulations to the hard-working Convention Committees who made this affair in our home town, Buffalo, a grand and glorious success!

It was a pleasure to renew acquaintance with scores of old friends, and to meet the host of new ones.

Samuel Greenfield Co., Inc.

MANUFACTURERS OF BRASS, BRONZE AND ALUMINUM INGOTS

31 Stone Street **HUmboldt 4050** **Buffalo 12, N. Y.**

Hit of the Show

Milwaukee scored again! Thousands of progressive foundrymen attending the Buffalo Show saw the Milwaukee Foundry Equipment Company exhibit and were favorably impressed with the complete line of Milwaukee Molding Machines.

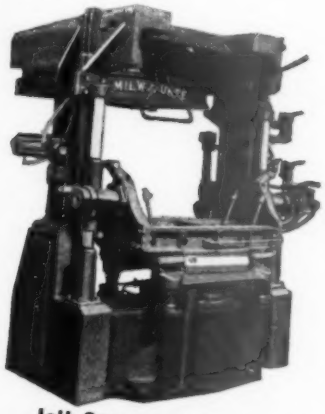
Now that you're back from the Show, why not give YOUR molders the "once over"? Are your machines modern? Do your methods give you MAXIMUM production? Are machines and methods adequate for both present and post war schedules?

Always dependable in the "pinches", the MILWAUKEE line provides a high-speed model for every molding requirement. And every machine is designed and built by practical seasoned foundrymen. So play safe! Look to MILWAUKEE for dependable, high-speed machines.

MILWAUKEE FOUNDRY EQUIPMENT CO.
3238 West Pierce Street • Milwaukee 4, Wisconsin, U. S. A.

Jolt Squeezer—Stationary Type

Jolt Squeezer—Portable Type

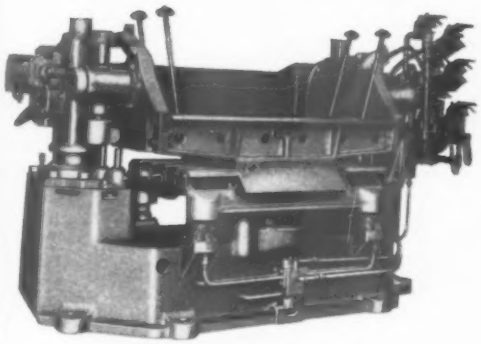


Jolt Squeeze Rollover Draw

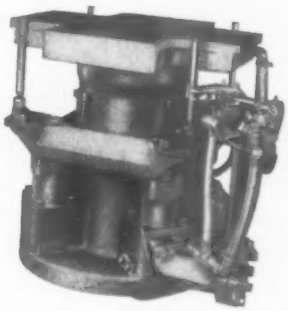
MILWAUKEE

MANUFACTURERS OF MOLDING MACHINES AND BRIQUETTING PRESSES

...at Buffalo!

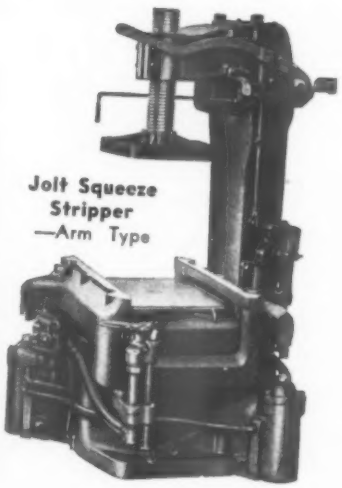


Jolt Rollover Draw
Available in 6 sizes.

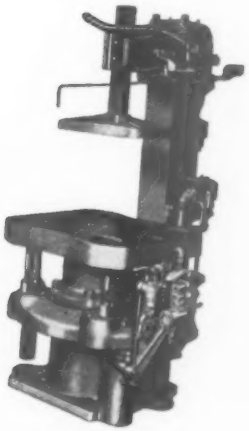


Jolt Pin Lifter
Available in 6 sizes.

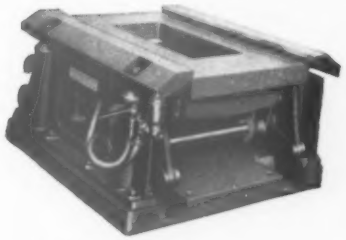
Jolt Squeeze Stripper
—Car Type



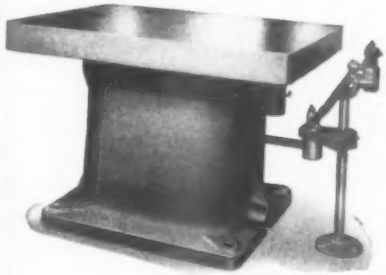
Jolt Squeeze Stripper
—Arm Type



Jolt Squeeze Pin Stripper

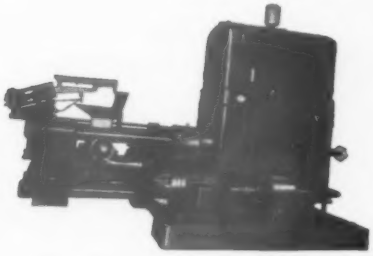


Power Rail Push-Off



Plain Jolt
Made in All Sizes

Core Grinder



Hydraulic Briquetting Press

...Foundry Equipment Co.

...RESSES 3238 WEST PIERCE STREET • MILWAUKEE, WISCONSIN, U.S.A.

The Time is 7 Years
The Accomplishments are Colossal

The recently concluded Third War Production Congress represented the eighth A. F. A. Congress at which we were privileged to explain the methods by which Hydro-Blast cleans castings of all sizes and kinds to microscopic cleanliness.

In retrospect, we wish to answer generally a few of the questions which were asked about Hydro-Blast during this most important of all foundry meetings to which America's foundrymen gave their time and money toward the betterment of a great industry and its individual members.

True, most of the men on the foundry firing line are familiar with the Hydro-Blast Method of cleaning castings to microscopic cleanliness and recovering formerly wasted sand in better than new condition.

By the same token, there were many whose cleaning room and sand supply problems presented a bottleneck to increased tonnage from their presently available floor space.

How does Hydro-Blast clean castings to microscopic cleanliness?

Through the propulsion of waste sand and water at a velocity of 3 miles per minute.

How does a Hydro-Blast and two men perform the casting cleaning work of ten chippers?

One man and a Hydro-Blast decores and surface cleans any kind or size of casting without back-breaking effort because the back pressure from a Hydro-Blast gun is less than 35 pounds. The high velocity stream produces a scrubbing effect that not only decores and cleans the casting but also reduces necessary machining but prolongs the life of machine tools because of absence of imbedded sand particles.

How does Hydro-Blast save millions of transport ton miles annually?

By recovering 85 percent of the sand input by weight, Hydro-Blast equipped foundries have reduced their freight car, barge and dump truck needs better than 75 percent.

How does Hydro-Blast improve working conditions?

Hydro-Blast releases workmen from the dull, dirty labor of grinding and chipping. It removes the work to the Hydro-Blast room where the atmosphere is cleaner than the air you breathe on the average city street.

How does Hydro-Blast usually return the investment during the first year of operation?

Economies in labor, time, transportation, and sand recovery disclosed by the Hydro-Blast survey most frequently indicate that the initial investment will be more than earned during the first year if Hydro-Blast is recommended. See a Hydro-Blast in operation. Ask the operator and the owner.

THE HYDRO-BLAST CORPORATION

2550 N. WESTERN AVE. • CHICAGO 47, ILL.

OUR INVASION TEAM

Official U. S. Marine Corps News Photo by Acme

When G. I. Joe hits the invasion beach, much of his equipment . . . from landing barges and motorized equipment that spearhead his advance, to planes that form a protective canopy over him . . . will have component parts made from aluminum alloys. And back of our invading soldiers stand the home-front workers whose conservation of aluminum scrap collected in manufacturing processes and kept carefully segregated, insures adequate supplies of these war-vital alloys.

But this teamwork would be incomplete without the teamwork in the smelters' own plants . . . teamwork that insures these new alloys meeting rigid quality specifications. By means of close cooperation between the laboratories and the production department it is possible to re-alloy this aluminum scrap into closely controlled ingot of proven quality.

This same controlled quality will benefit foundries postwar . . . enabling them to make better castings at minimum cost for better civilian products.

Aluminum and Magnesium, Inc.
Sandusky, Ohio

The American Metal Company, Limited
New York City 6

Apex Smelting Co.
Chicago 12, Illinois

The Cleveland Electro Metals Co.
Cleveland 13, Ohio

Federated Metals Division American Smelting and Refining Company
New York City 5 and Branches

General Smelting Company
Philadelphia 34, Pennsylvania

Samuel Greenfield Co., Inc.
Buffalo 12, New York

William F. Jobbins, Inc.
Aurora, Illinois

R. Lavin & Sons, Inc.
Chicago 23, Illinois

The National Smelting Company
Cleveland 5, Ohio

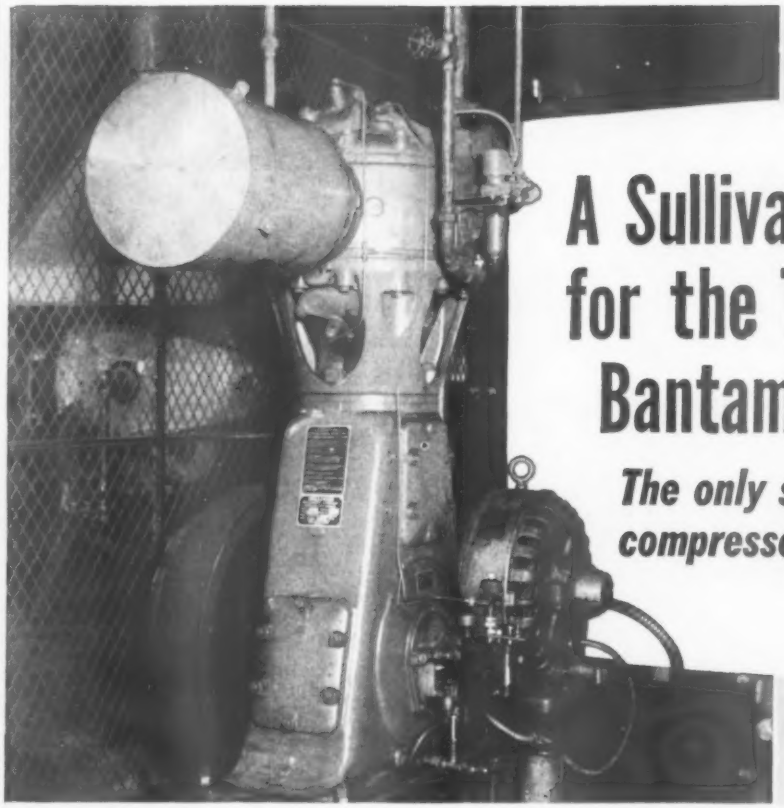
Niagara Falls Smelting & Refining Corp.
Buffalo 17, New York

Sonken-Galamba Corporation
Kansas City 18, Kansas

U. S. Reduction Co., *East Chicago, Indiana*

ALUMINUM RESEARCH INSTITUTE
111 West Washington Street, Chicago 2, Illinois

BUY BONDS



A Sullivan WG-9 Compressor for the Torrington Company Bantam Bearings Division

The only single-stage, double-acting compressor with these 4 advantages

The Torrington Company, Bantam Bearings Division, already had a Sullivan WG-8 Compressor. Thus they *knew* Sullivan dependability; so when they needed more air, they bought its successor, the Sullivan WG-9. Behind its outstanding performance are features such as the following:

1. Single-purpose alloy steels are *used for single purposes.* Thus in moving parts, Sullivan uses the alloy steels known to resist wear to the utmost. In connecting rods, Sullivan uses the alloys with the utmost ruggedness . . . and drop forged. Again, it has been known for many years that modern single-acting cylinders with honed liners and tinned pistons are almost devoid of wear. That is the construction employed in the WG-9.

2. And to pile value on top of value, cylinder and crosshead liners can be replaced easily, quickly, cheaply . . . to bring back new machine efficiency when actually the compressor is old.

3. The famed Sullivan Dual-Cushion Variable Reaction Valves . . . used in every Sullivan Compressor and proved by hundreds of thousands of hours of faultless performance.

4. The WG-9 Compressor offers maximum capacity per foot of floor area. It has full force-feed lubrication to all working parts—and heavy-duty antifriction main bearings.

The Sullivan WG-9 Industrial-Air is a heavy-duty compressor for 24 hour service in smaller industries or specialized requirements in larger plants. It is available in 11 capacities, from 153 to 822 CFM, at 30 to 150 lbs. pressure . . . SULLIVAN MACHINERY COMPANY, Michigan City, Indiana. In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.

4 THINGS TO MAKE SURE OF WHEN YOU BUY AN AIR COMPRESSOR

1 *Are moving parts made of longest-life material available . . . and not a compromise?* Note for example, WG-9's generous size crossheads, tin plated and running in mirror-finish honed liners of tough alloy steel . . . almost obviating wear.

2 *After long service, can working parts be easily replaced by you in your plant, bringing back "New Machine Efficiency?"* The special alloy steel liners in the WG-9 can be thus renewed.

3 Are soundest basic engineering concepts followed? How does the valve operate? What about air passages? What is the *truth* about flywheel and pulley wheel combined?

4 Is overall design simple, accessible yet built to eliminate the usual adjustment and readjustment so common with compressors? All users agree that Sullivan Compressors never need "break-in" adjustments and give least trouble of any.

OFFICES

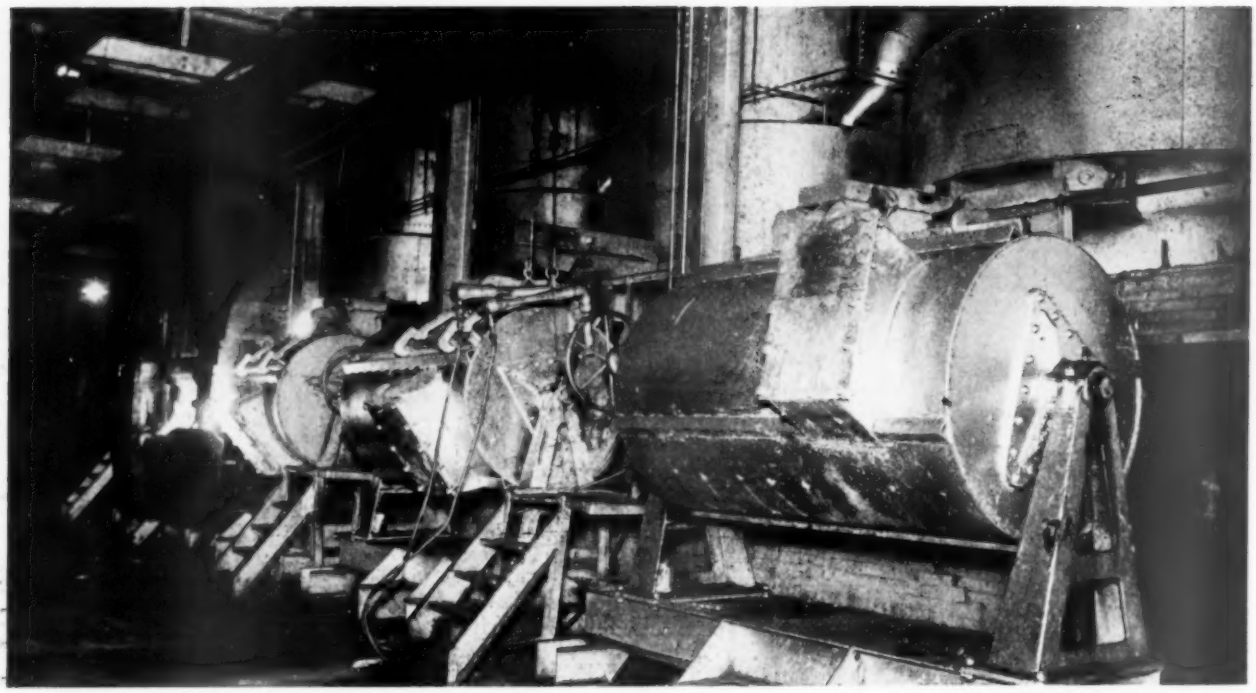
Seattle	Portland	San Francisco	Los Angeles	Salt Lake City
Boston	Pittsburgh	Birmingham	Duluth	Scranton
New York	St. Louis	Knoxville	El Paso	Denver
Chicago	Detroit	Huntington	Butte	Dallas

SULLIVAN

AIR COMPRESSORS

STATIONARY AND PORTABLE AIR COMPRESSORS FROM ¼ TO 3000 H. P., PNEUMATIC CASTING GRIPS, FOUNDATION BREAKERS, PORTABLE HOISTS, ROCK DRILLS

"IRONTON NOJOINT" for Foundry Ladles



"Ironton Nojoint", a special type of plastic ramming refractory, is giving excellent service in forehearths, mixing ladles and desulphurizing ladles where fused soda ash is used. It lasts much longer than regular fire brick or special shapes because the solid, dense, monolithic lining of "Ironton Nojoint" is free of joints and is highly resistant to alkaline slags.

"Ironton Nojoint" is easily and quickly installed, it is economical to use and it is shipped in steel drums to prevent drying out in storage.

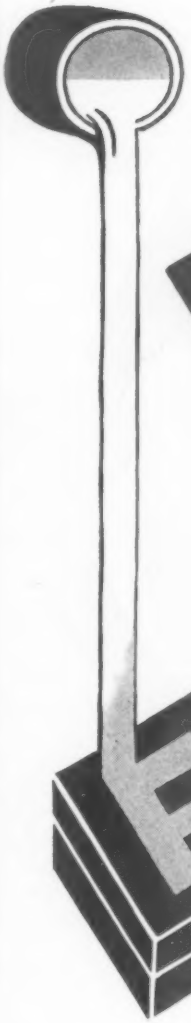
We offer you the assistance of a service engineer in installing your original lining and training your men to do the job.

Address Box 109

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO



FUEL Economy AND FURNACE Efficiency

Correct furnace atmosphere is all important for best melting conditions with fuel economy at its highest and melting speed at its best for all purpose economy. Wartime light metal melting experience has established that the best conditions for pot life and efficiency of heating are reached when a "neutral" furnace atmosphere can be maintained with maximum CO_2 and only a trace of CO and free oxygen present.

A prime requisite in obtaining this ideal condition is the use of multiple burners with a proportional mixer or equal for maintaining the proper gas and air mixture, and an air-oil ratio controlling device if oil is used.

These and other principles, although not commonly taken into full consideration, are a basic part of the design of Fisher Furnaces and are features which will be sought, after the day returns when low operating costs will be of first importance again. Fisher's Non-Ferrous Metal Melting experience also offers you (1) the benefit of many years of experience in foundry equipment coordination and (2) a wide selection of melting furnaces including electric and hydraulic tilting, hand tilting and stationary types incorporating the latest mechanical features, with a capacity for every purpose.

Present your Non-Ferrous Melting and Layout problems to Fisher. Write for complete information.

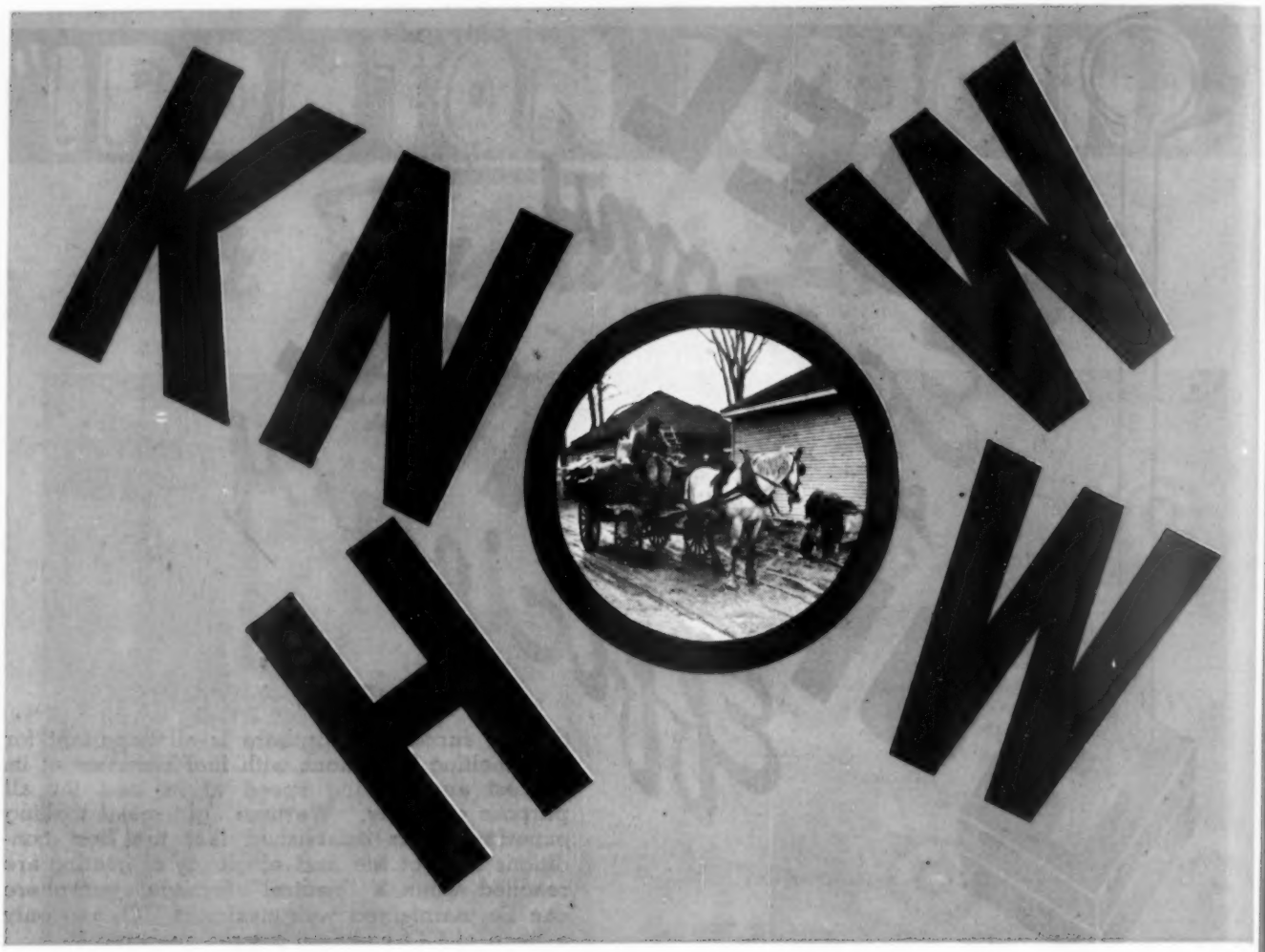
A battery of Fisher Electric Tilting Nose Pour Furnaces in a modern foundry in California. As a wartime emergency measure these furnaces were designed to be fired with either gas or oil with quick change-over.

Capacities shown are 1200 pounds of brass, or 400 pounds of aluminum.

5519 North Wolcott Ave., Chicago 40, Ill.

Fisher FURNACE COMPANY

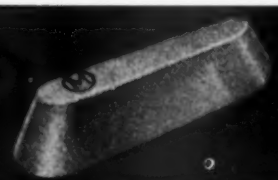
Engineers and Manufacturers



THE only thing that interests you about non-ferrous ingot made by Michigan Smelting is the kind of castings you can make from it in your own plant. How accurately do we hold to your specifications so that wastage and spoilage will be held to an absolute minimum? On that point the "know-how" of this organization is important to you.

For it is your guarantee of satisfaction with our product. Fifty years of experience in the refining of non-ferrous scrap, plus up-to-the-minute equipment, enable Michigan Smelting to make ingot to the most rigid and exacting specifications —a product that in many respects is superior to alloys of virgin metals.

BUY
WAR
BONDS



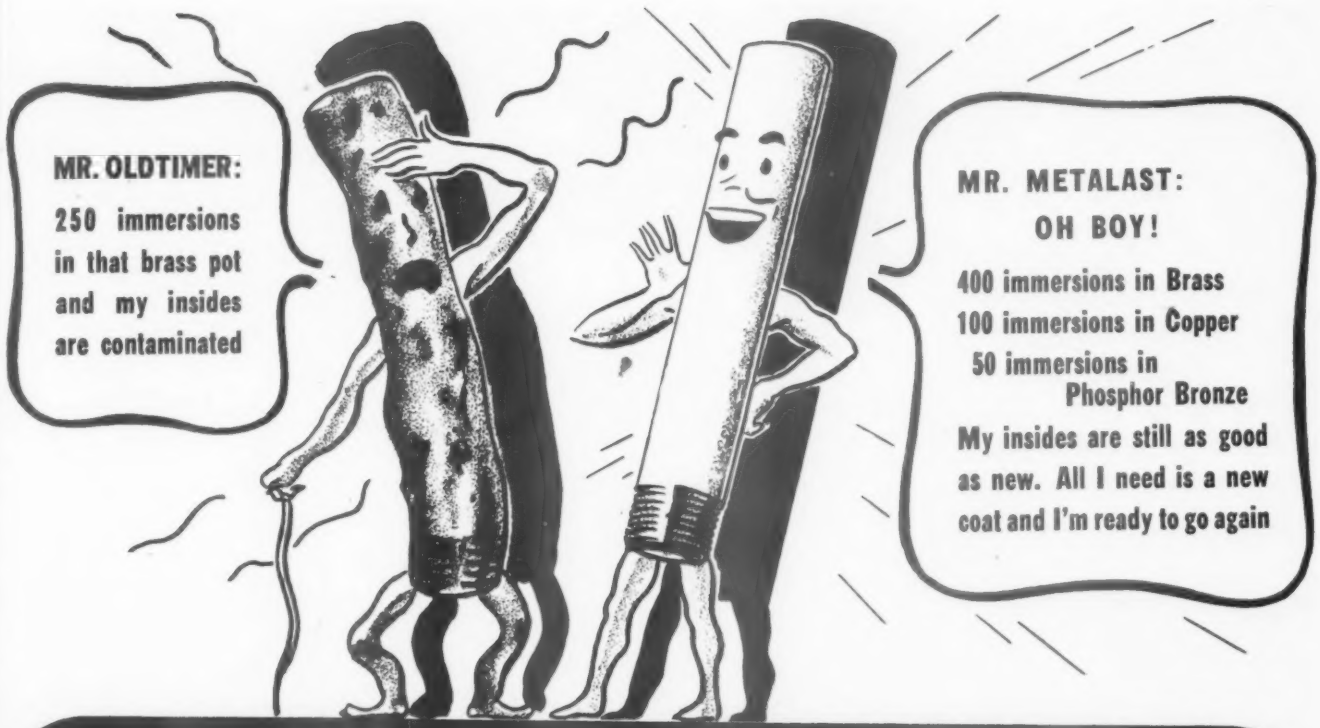
REFINERS OF NON-FERROUS SCRAP
METALS FOR OVER 50 YEARS

MICHIGAN SMELTING and Refining

Division of

BOHN ALUMINUM & BRASS CORPORATION · Detroit, Michigan

General Offices: Lafayette Building


MR. OLDTIMER:
250 immersions in that brass pot and my insides are contaminated
MR. METALAST:
OH BOY!
400 immersions in Brass
100 immersions in Copper
50 immersions in Phosphor Bronze
My insides are still as good as new. All I need is a new coat and I'm ready to go again

For MOLTEN METALS . . .

Use METALAST *Replaceable* PROTECTION TUBES

. . . *Save* YOUR THERMOCOUPLE COST

The ONE PIECE Protecting Tube - NO WELDS - NO SEAMS - NO FORGING
Drilled from special high temperature alloy solid stock

When your METALAST *replaceable* tube is worn out, your thermocouple is still as good as new. That's how METALAST saves your thermocouple cost because it saves your thermocouple

The METALAST Tube is used exclusively by some of the largest brass and copper companies in the country for brass, high copper and phosphor bronze.

Tests by many of our largest users give average reports as follows:

400 immersions in Brass
100 immersions in Copper
50 immersions in Phosphor Bronze

The METALAST Tube is made exclusively by the Elematic Equipment Corporation and has been widely used by foundries and non-ferrous smelters throughout the country for over six years.

Made in two sizes—6" and 8" lengths, 7/8" O.D. x 1/2" I.D. Standard 1/2" pipe thread

METALAST *Junior*

A *New* ELEMATIC PRODUCT

200 Immersions in Brass
80 Immersions in Copper
50 Immersions in Phosphor Bronze

Due to increasing demands from our customers for a longer tube, ELEMATIC is introducing the METALAST, Junior. Made from special high temperature alloy seamless tubing with rolled closed end—no welding rod or torch used in processing.

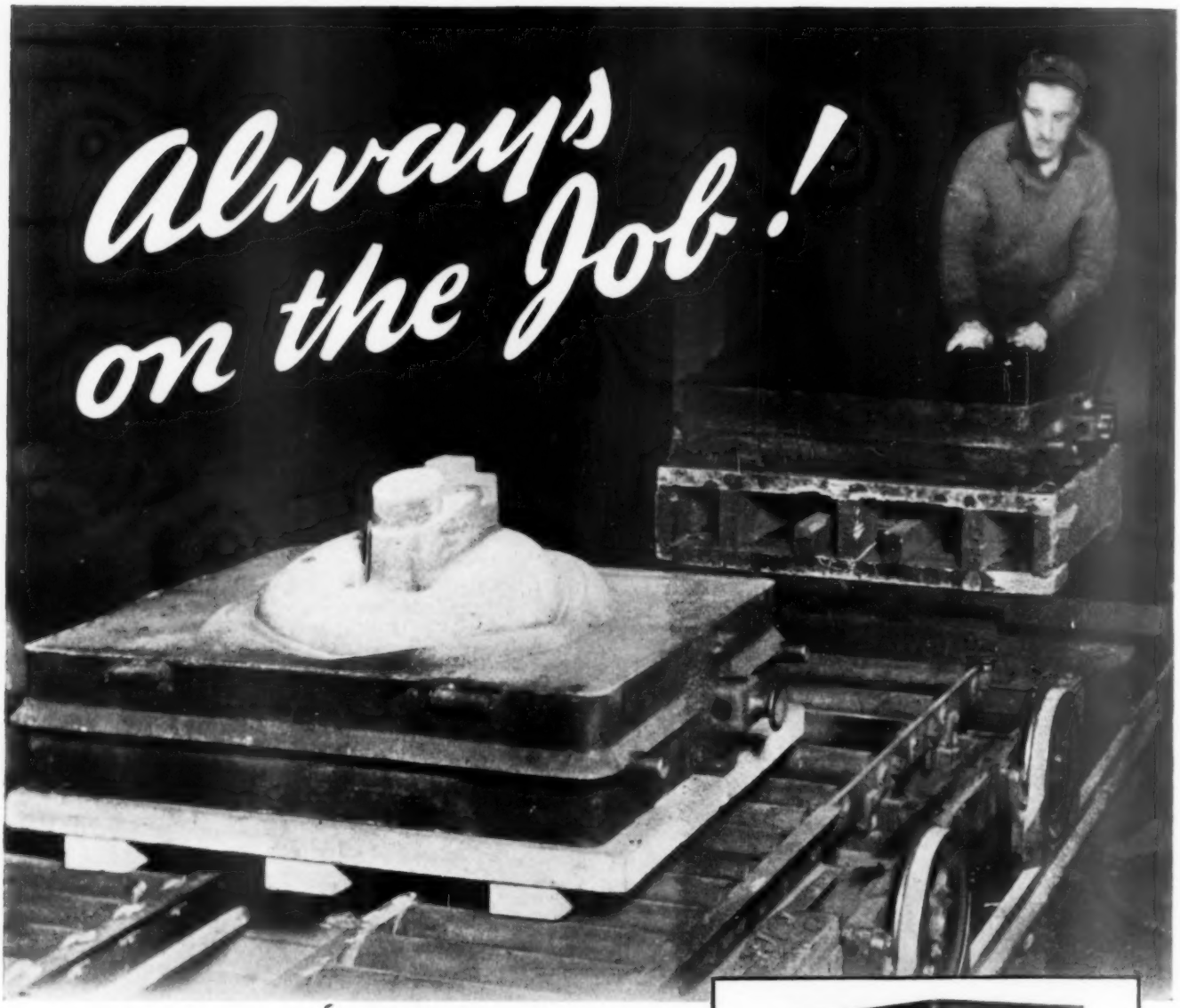
Made in four standard sizes—with or without 1/4" standard pipe thread—6", 8", 10" and 12", 9/16" O.D. x 5/16" I.D.

Write for prices and quantity discounts

ELEMATIC EQUIPMENT CORPORATION

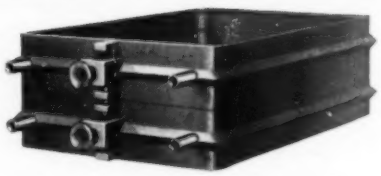
6046 WENTWORTH AVE., (Phone: Englewood 7119) CHICAGO 21, ILL.

Always on the Job!



Sterling Flasks are dependable LIFETIME flasks, always on the job. Solidly constructed of all-welded rolled steel with re-inforcing ribs, square flanges and full width bearings, Sterlings offer a happy combination of maximum strength and minimum weight. Decide now to standardize on Sterling LIFETIME Flasks. They speed up molding . . . save money on the long run.

Write, today, for further particulars.



STERLING STYLE "LT" FLASK with double pin lugs, steel handles, trunnions and clamping bars welded to each section. Illustration above shows "LT" flasks on the job in large eastern foundry.

Sterling FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY • MILWAUKEE, WIS., U. S. A.

A 4403-1P

55 YEARS OF SERVICE

TO AMERICAN INDUSTRY

In 1889 this company was founded as the Peninsular Emery Wheel Company. Later, with the rapid growth of artificial abrasives, the name was changed to Peninsular Grinding Wheel Company. The plant has always occupied the present location and since 1917, the same management has been in office. Peninsular has enjoyed a steady growth since the day the plant opened. It has kept pace with every new development in the manufacture, application, and engineering of grinding wheels. Many new and valuable contributions to the industry both in abrasive wheels and machinery for their manufacture have originated at Peninsular.

Today, Peninsular Grinding Wheel Company is a modern plant, efficiently equipped for production of high quality, *individually engineered* wheels to industry.

PENINSULAR

GRINDING WHEEL COMPANY

729 MELDRUM AVENUE • DETROIT 7, MICHIGAN

MAHON *Mechanized* CORE OVENS

Designed, Built and Installed by Mahon Engineers

CAPACITY OF EACH OVEN
12000 Pounds of Sand Per Hour

LENGTH, 240 feet • WIDTH, 13 feet
HEIGHT, 9 feet

BAKING TIME, 4 hours at 450° F.

GAS FIRED

These MAHON Products also contribute to modern foundry operation . . .

- **Hydro-Foam DUST COLLECTING SYSTEMS**
- **BLACKING BOOTHS**
- **VENTILATING SYSTEMS**

THE MAHON *Hydro-Foam* DUST COLLECTOR completely clears working areas of dust, taking the dust out of circulation and depositing it under water.

MAHON BLACKING BOOTHS exhaust overspray from "blacking" operations — provide complete operator protection—localize and speed up work.

MAHON VENTILATING SYSTEMS supply with clean, fresh, conditioned air (washed, tempered) for every foundry purpose.

Mechanization . . . .

THE KEY TO PROFITABLE FOUNDRY OPERATION OF THE FUTURE . . . AS WELL AS THE PRESENT

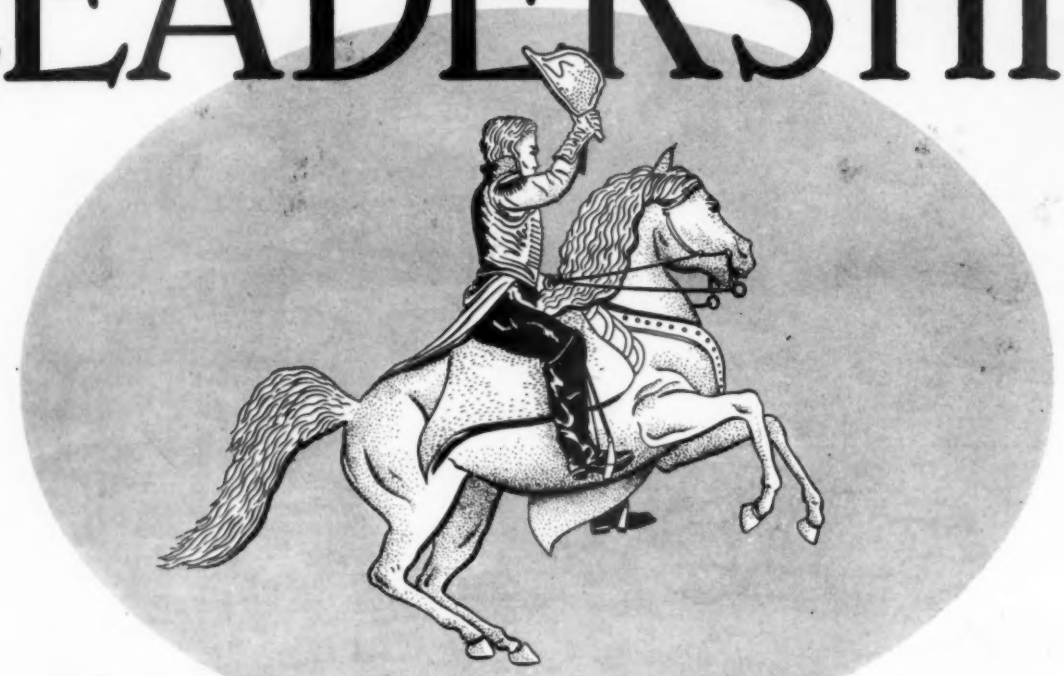
In modern foundries, today, hand operations have given way to an entirely new era of mechanization. Production travels by fast-moving conveyor lines through every stage of manufacture—from core-making to the final machining of castings. Complete systems for baking, spraying and drying cores and molds . . . effective dust collecting systems . . . modern ventilating systems . . . have been developed and installed by Mahon for several foremost foundries. To bring your own core and mold making operations to the peak of efficient performance, call in Mahon engineers. They are prepared to give you sound advice in the revising and mechanizing of your equipment and working conditions . . . practical and workable recommendations you can depend on to the utmost . . . assuring faster, finer output.

THE R. C. MAHON COMPANY

DETROIT 11 — CHICAGO 4

...ufacturers of Metal Cleaning Machines • Rust Proofing Machines • Hydro-Filter Spray Booths • Ovens of All Types • Filtered Air Sup-... Units • Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—including Complete Finishing Systems

LEADERSHIP



In War and Peace

Time has not changed the need for rugged leadership. Andrew Jackson, the hero of the battle of New Orleans and the leader of his fellowmen proved that Americans have always had the foresight to choose the finest, not only in War but in Peace.

Just so has "JISCO" Silvery Iron become the choice of foundrymen who demand the best America has to offer. "JISCO" Silvery makes it possible to cast complicated diesel engine blocks in one piece, heavy machine tools with fine sections, shock-proof crankshafts for army trucks, and many other vital castings.

"JISCO" Silvery is a modern product for modern industry. It has a use wherever ferrous metals are cast.

HIGH SILICON IRON "JISCO"

THE JACKSON IRON & STEEL *Company*
JACKSON, OHIO.

Better "Conduit Fitting" Castings

from Royer Conditioned Sand!

The locomotive engineer knows his sand

It must be tough sand — not too easily pulverized between drive wheel and rail — if it is going to do its essential part in getting thousands of rolling tons into motion.

The Royer gives foundrymen the kind of sand they know makes better molds and cores —sand given "six point" conditioning as only the Royer can do it!

This Royer Sand Separator and Blender is conditioning sand at the Wisconsin Appleton Company, South Milwaukee, Wisc. In this busy foundry many small intricate malleable castings are made. Connectors, fixture hickeys and other conduit fittings are made in quantity from production patterns.

Smooth castings are the result of proper sand and further conditioning the sand with a Royer.

The velvety, open sand discharged by a Royer makes true-to-pattern molds, and greatly reduces such causes of discount as run-outs, drops, surface inclusions and rough finish. No matter what kind of sand is used, or what its condition or temperature, the "thousand fingers" on the Royer's combing belt really open it; release gases, break up clay balls and remove hard fused lumps and trash which might pass a screen to spoil a mold. The sand is twice aerated; once on the belt and again on the discharge.

Over 5,700 Royers are now in service. There's a portable or stationary model for every foundry requirement. Get the facts!

THE ROYER FOUNDRY & MACHINE CO.
KINGSTON, PENNSYLVANIA

FOREMOST IN SAND CONDITIONING EQUIPMENT

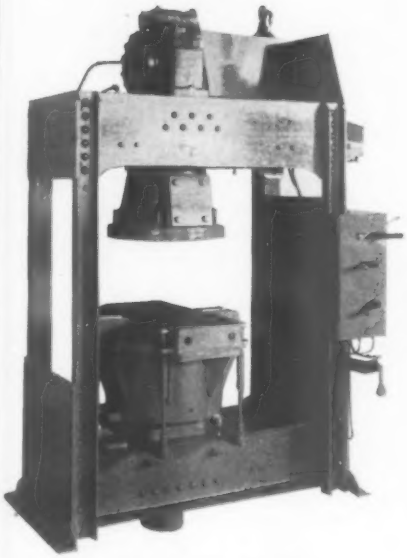
Aluminum ALLOY INGOT

Every **S-G Ingot** must meet your specifications. We employ the closest metallurgical control to insure uniformity of composition. From the purchase of raw material, through the final process, skilled laboratory technicians make constant tests to eliminate the slightest variance. Speed your output and minimize production hazards. Specify **S-G Aluminum Alloy Ingots** . . .

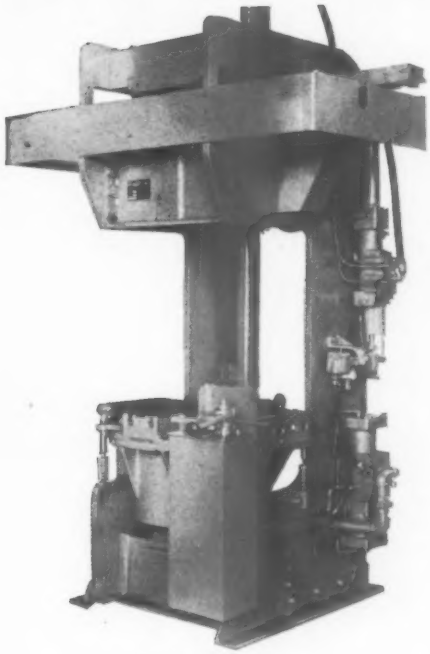
they're laboratory controlled

SONKEN-GALAMBA
Corporation
(MEMBER ALUMINUM RESEARCH INSTITUTE)
Riverview at 2nd Street · Kansas City, 18, Kansas

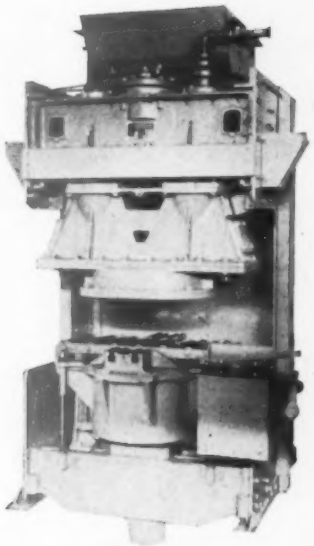
CORE BLOWERS *Exclusively*



DEMMLER No. 4E



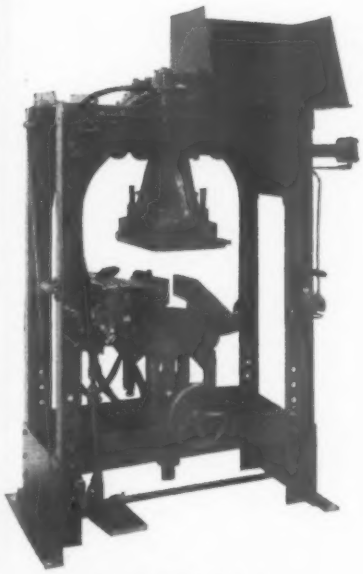
DEMMLER No. 8



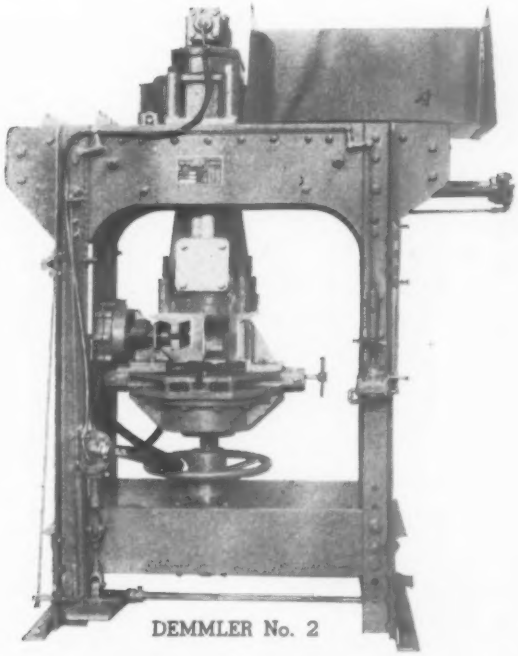
DEMMLER No. 5

Recent additions to our line are the No. 4E and No. 5 machines, designed for blowing cores for large airplane motor castings. Features include an accurate core box draw, table equipped with Timken rollers, control mechanism totally enclosed.

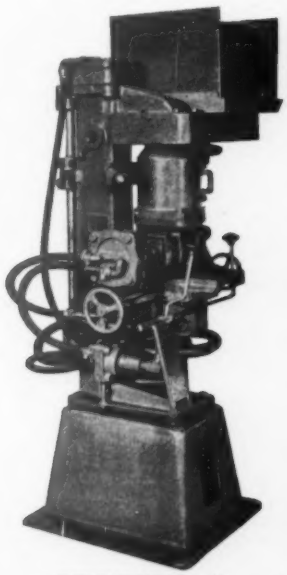
At this time we have capacity to make good deliveries, and suggest that you check with us on your anticipated requirements.



DEMMLER No. 1



DEMMLER No. 2

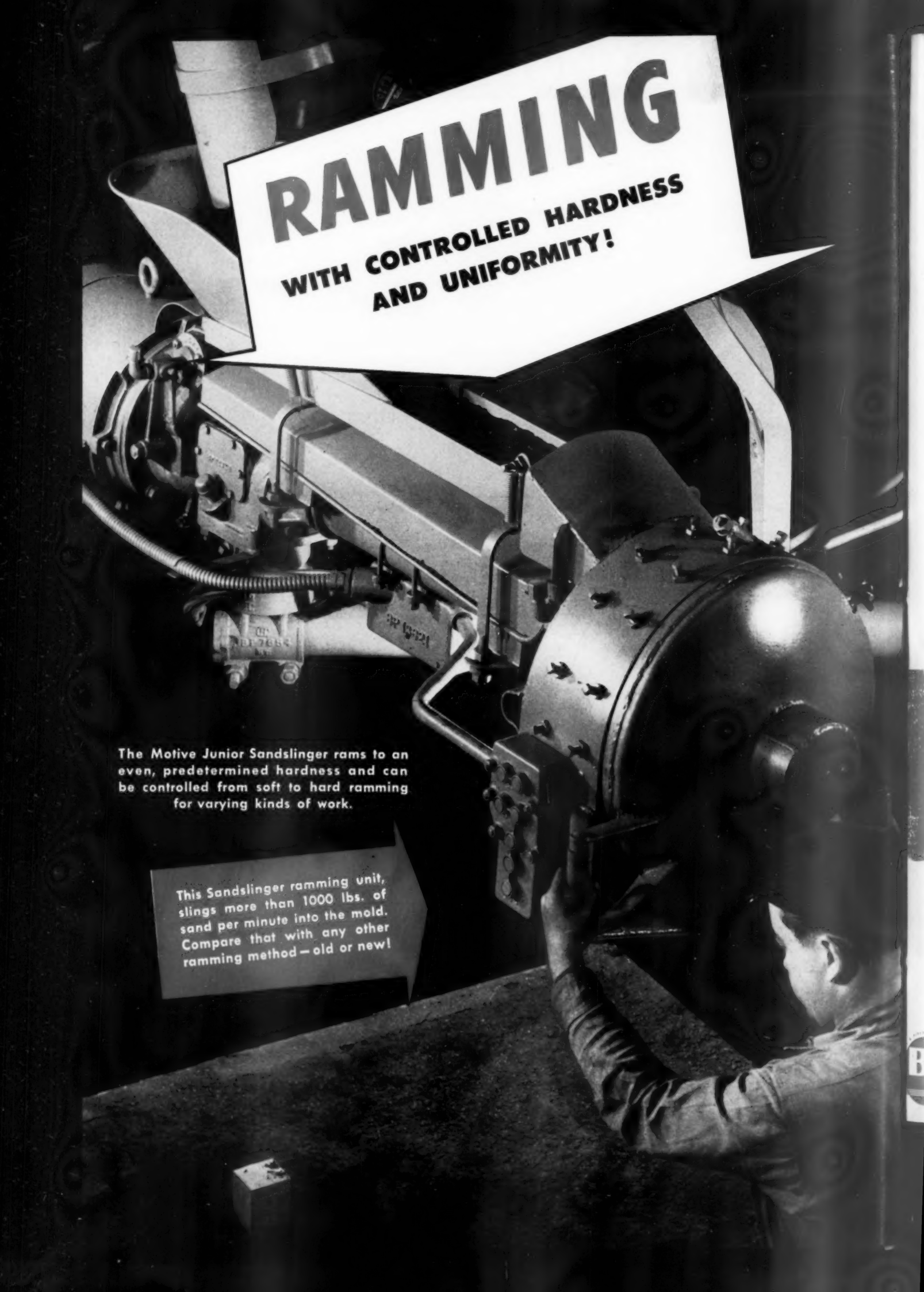


DEMMLER No. 0

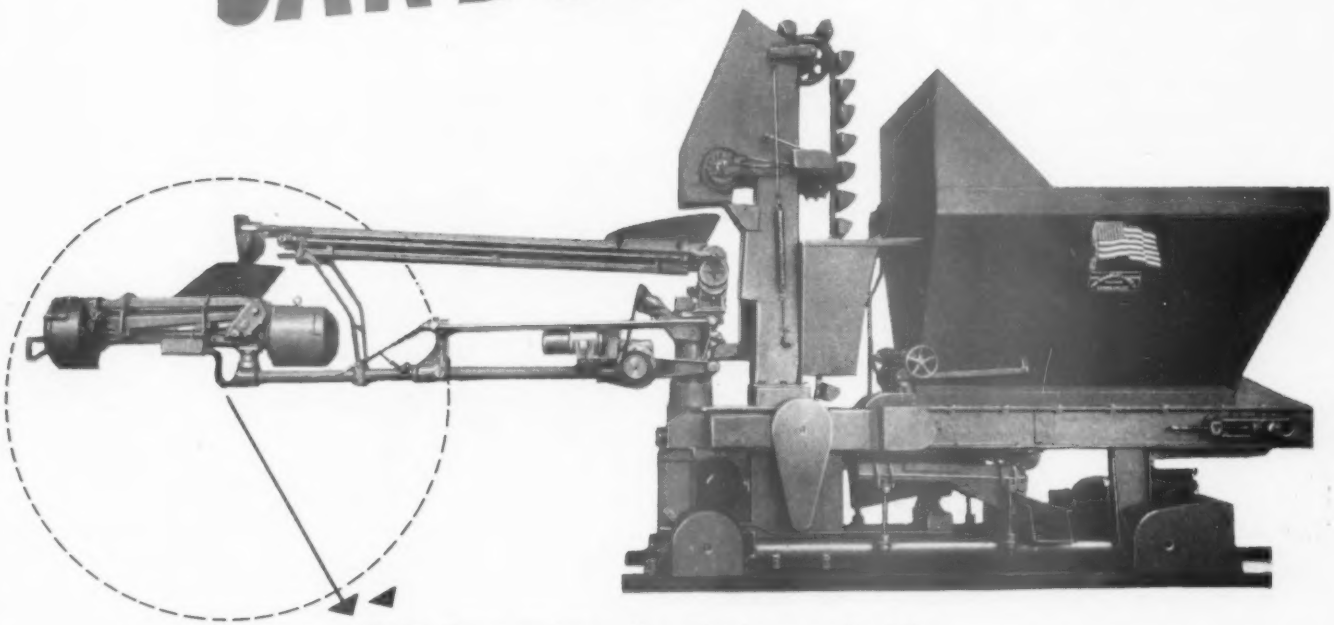
WM. DEMMLER & BROS.
KEWANEE, ILLINOIS

DEMMLER

1944


RAMMING
WITH CONTROLLED HARDNESS AND UNIFORMITY!
The Motive Junior Sandslinger rams to an even, predetermined hardness and can be controlled from soft to hard ramming for varying kinds of work.
This Sandslinger ramming unit, slings more than 1000 lbs. of sand per minute into the mold. Compare that with any other ramming method—old or new!

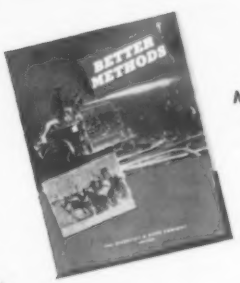
the MOTIVE JUNIOR SANDSLINGER



This is the ramming unit or "business end" of the Sandslinger which feeds and rams the sand into the mold. It freely turns upon anti-friction radial bearings that are completely enclosed and dust proof. The unit can be easily moved by one man to any position within its molding range.

Outstanding for its flexibility, the Motive Junior Sandslinger is the perfect method of ramming for jobbing and semi-production foundries. Molds, cores and pit jobs can be rammed with equal facility and economy. The Sandslinger does an exceptionally efficient job of ramming simple or complex castings in either green or dry sand molds.

The Sandslinger delivers the right amount of sand in the right place at the right time. It saves substantially in metal, floor space, direct labor charges and cleaning time. This versatile, easy to operate Sandslinger has the recommendation of hundreds of foundries—large and small.



Get this interesting Monthly Foundrymen's Magazine . . . Free! Write for it now!

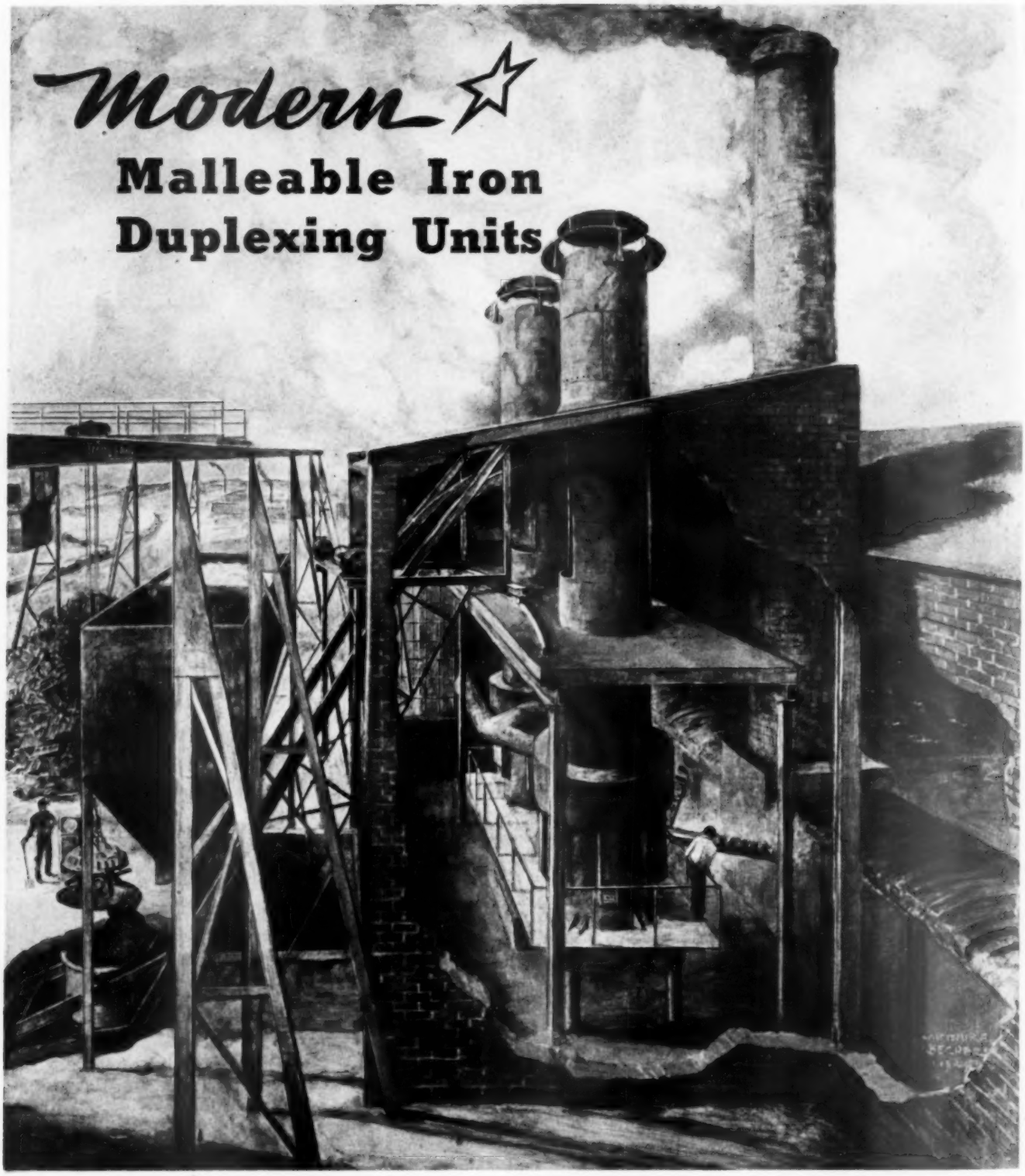
Sandslingers are made to fit the particular needs of your foundry. A number of types are available—Speedslingers—Motive, Tractor and Stationary Sandslingers. The entire mechanism of the Sandslinger is electrically driven. Ramming capacities range from 7 to 20 cubic feet of sand per minute.

A Beardsley and Piper engineer will be glad to study your foundry layout and recommend the type of Sandslinger best suited to your foundry needs. Write today.

THE BEARDSLEY & PIPER COMPANY

2541 North Keeler Avenue, Chicago 39, Illinois

THE BEARDSLEY & PIPER COMPANY ARE MANUFACTURERS OF SANDSLINGERS, SPEEDSLINGERS, SPEEDMULLORS, SCREENARATORS, SHAKE-OUTS, SAND CONDITIONING MACHINES, GYRATORY SCREENS



present the last word in scientific, low-cost melting. Efficient handling of yard materials assured with magnet crane charging and with drop bottom bucket swivel charging unit serving two cupolas alternately. Cross spout arrangement serves two air furnaces alternately. Efficient cupola melting is the most important essential in efficient duplexing. Let Modern engineers outline a system for your foundry.

MODERN EQUIPMENT COMPANY

PORT WASHINGTON, WIS.

Cupolas • Cupola Chargers • Lifetime Geared Ladles • Ladles • Electric Cranes
Metal Pouring Systems • Covered & Insulated Ladles • Improved Bottom Pour
Furnace Charging Cranes • Crane & Monorail Systems

MODERN EQUIPMENT CO.
PORT WASHINGTON, WIS.
DEPT. 184

Now you can DESCALE in a fraction of the time!

The section marked in chalk, measuring 8" wide and 14" deep, was descaled in 22 seconds with an Airco descaling torch. Note the scale-free surface, the absence of chisel dents and the scale which has been removed, lying in the troughs at the side.

In actual tests, Airco-perfected flame descaling has removed furnace scale on steel castings in less than one-fourth the time required by the mechanical chisel—and left a much cleaner surface, unmarred by chisel dents.

In this simple process, adhering scale is heated by the descaling torch to a temperature at which the heat differential between the hot, expanding scale and the relatively cool parent metal causes the scale to pop off. By the use of selected tips it is possible to clean corners and depressions inaccessible to the mechanical chisel.

Where the casting is to be painted, a better bond between the paint and the base is assured because the heat of the torch drives all moisture from the surface of the metal.

SEND FOR FREE BOOK

"New and Improved Oxyacetylene Methods for Steel Foundries". It gives a detailed description of many recently-developed flame methods that are helping to speed production, improve casting quality, and reduce costs. Don't fail to mail the coupon for your free copy.

Air Reduction Sales Co.
60 E. 42nd St.,
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Please send me by return mail a free copy of your new book "Oxyacetylene Methods for Steel Foundries"

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★ BUY UNITED STATES WAR BONDS ★

AIRCO WILSON

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General Offices: 60 East 42nd Street, New York 17, N. Y.
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CARRY CORES UP TO 1200 LBS. WITHOUT DEFLECTION!

Note the reenforcing construction used on this typical large plate. The arc welded frame gives rigidity, strength and eliminates deflection.

IT IS BEING DONE ON DIAMOND REENFORCED STEEL CORE PLATES

These special core plates are designed to carry large cores up to 1200 lbs., cores of any size, without deflection or warping.

You may obtain Diamond Core Plates to suit your own special requirements. They are furnished with or without perforations and in all smaller, standard sizes—plain or reenforced as indicated by your needs.

Send us detailed information on your core baking problem and we'll be glad to design a plate to handle the job. Weight of core and dimensions, in particular.

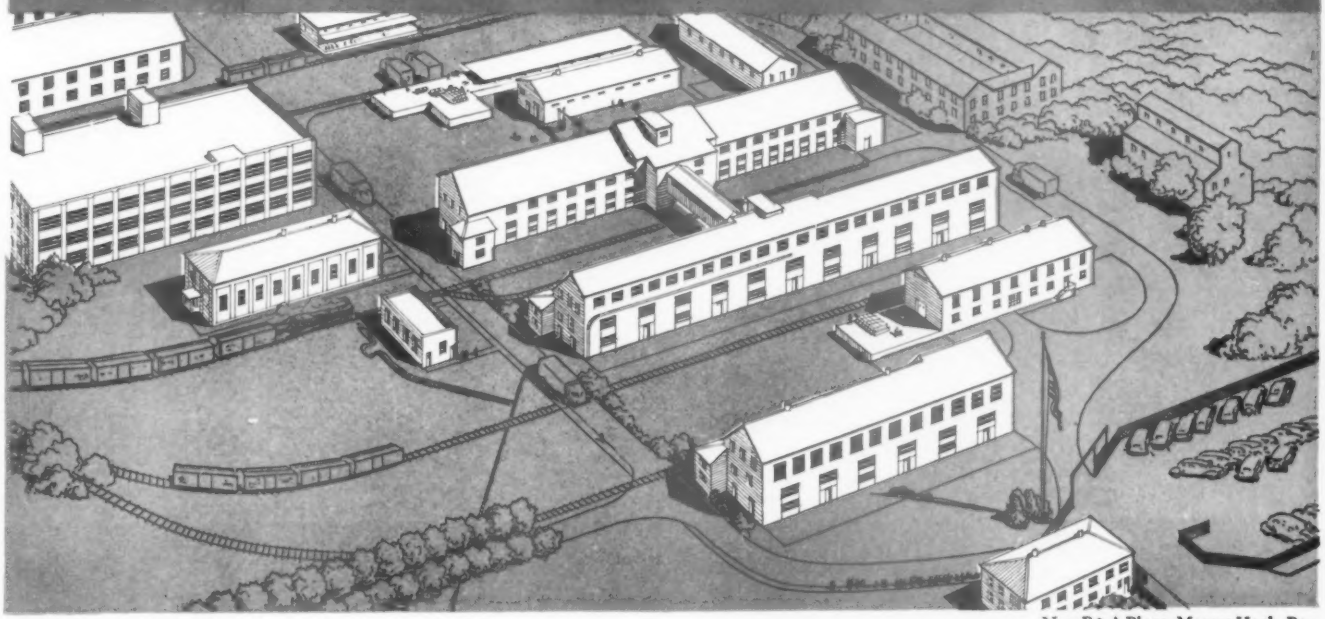
DIAMOND

CLAMP AND FLASK COMPANY

Telephone 2553 **Richmond, Indiana**

Designers of CORE PLATES, JACKETS, BANDS, FLASKS since 1889

AGAIN *GENERAL CHEMICAL* CREATES NEW FACILITIES FOR BAKER & ADAMSON PRODUCTS TO SERVE AMERICAN INDUSTRY!



New B&A Plant, Marcus Hook, Pa.

THESE NEW FACILITIES for production of Baker & Adamson reagent and fine chemicals provide ideal manufacturing areas, additional research and development laboratories, and special storage and shipping accommodations. This plant's output, coupled with that of other Baker & Adamson producing units and distributing stations throughout the United States, marks another forward step in Baker & Adamson leadership.

Basic materials for many Baker & Adamson quality products made here come directly from sixteen of General Chemical Company's producing locations. With such fundamental sources of supply, including many Company-owned mines for raw materials, Baker & Adamson is in a pre-eminent and unique position for meeting the expanding uses of high-purity chemicals in industry.

Whether you require laboratory reagents, fine chemicals, or other products prepared in accordance with your formulae—avail yourself of the Baker & Adamson facilities. Experienced technical service representatives are ready to discuss *your* chemical problems and requirements. Baker & Adamson stocks are carried in many principal cities!

GENERAL CHEMICAL COMPANY

Fine Chemicals for Industrial America

GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N.C.) Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Milwaukee • Minneapolis New York • Philadelphia • Pittsburgh • Providence (R. I.) • St. Louis • Utica (N. Y.)

Pacific Coast Technical Service Offices:
Los Angeles • San Francisco • Seattle, Wenatchee and Yakima (Wash.)

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NORTON Resinoid WHEELS

on Seven Important Grinding Jobs

It's "Know-How" That Produces Results for Norton Resinoid Grinding Wheels

1. **Research "Know-How"** — It took Norton laboratory men thousands of man-hours to perfect the various Resinoid bond formulas in use now — each right for a certain type of grinding.
2. **Manufacturing "Know-How"** — Men who have been making grinding wheels for from a quarter to a half century put their knowledge to use with the best equipment obtainable.
3. **Engineering "Know-How"** — But it's the Norton abrasive engineers who get into the shops and make the final selection — a selection that may make the difference between success and failure of a grinding wheel.

No, Resinoid bond alone does not assure the best grinding wheel performance. It needs the Norton "Know-How" to get the maximum in production.

BILLET GRINDING

Popular Specification of NORTON RESINOID WHEELS

Weld Grinding

24-Q4T-H (straight wheel)
16-P4T-H (cup wheel)

Disc Grinding

16-K4T (Steel)
3724-K5T-L (Cast Iron)
3730-J4T (Aluminum)

Snagging

Swing Frames
14/2-P4T-L (Steel Castings)
3714-04T (Cast Iron)

Floor Stands
14/2-04T-L (Steel Castings)
3716-04T (Cast Iron)

Thread Grinding

150-U9T-H

Cutting Off

30-W7T (Steel)
24/5-S8T (Aluminum)
(#12 Treated)

Roll Grinding

3736-M7T (Chilled Iron)

Billet Grinding

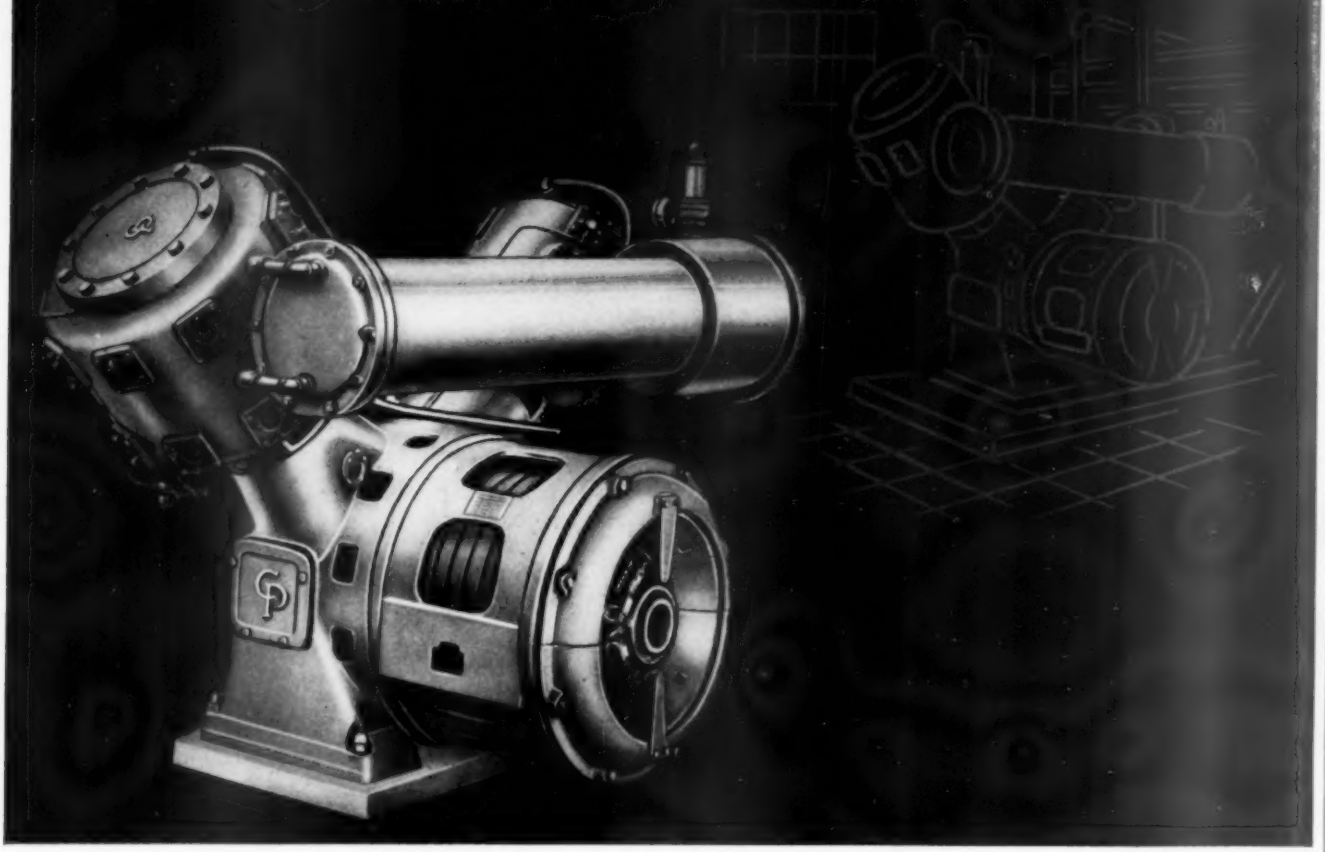
12/3-T4T-H (Swing Frame)
24-P4T-H (Portable)

These specifications have proved outstandingly popular in many plants. Norton abrasive engineers will be glad to study your specific jobs and recommend the resinoid wheels most suited for your particular conditions.

NORTON ABRASIVES

NORTON COMPANY
Worcester 6, Mass.
Distributors in All Principal Cities

SHIPPED INTACT
Quickly Installed



. . . CP "Package Type" Compressor

SHIPPED intact, all ready for external connections, CP Type Y Compressor is easily and quickly installed. It is exceptionally compact, requiring only minimum floor space. Large area Simplate valves, multi-step capacity regulation, effective intercooling, precision bearings and force-feed lubrication are responsible for its low power consumption and low maintenance costs. CP Type Y compressors with built-in or direct coupled motors or with V-belt drive are available in capacities of 300 to 900 c.f.m. at 80 to 125 pounds pressure; other sizes available for higher and lower pressures. Write for Bulletin 766.

There is a CP Compressor, stationary or portable, for every air requirement from 25 to 10,000 c.f.m. for pressures up to 5,000 pounds.

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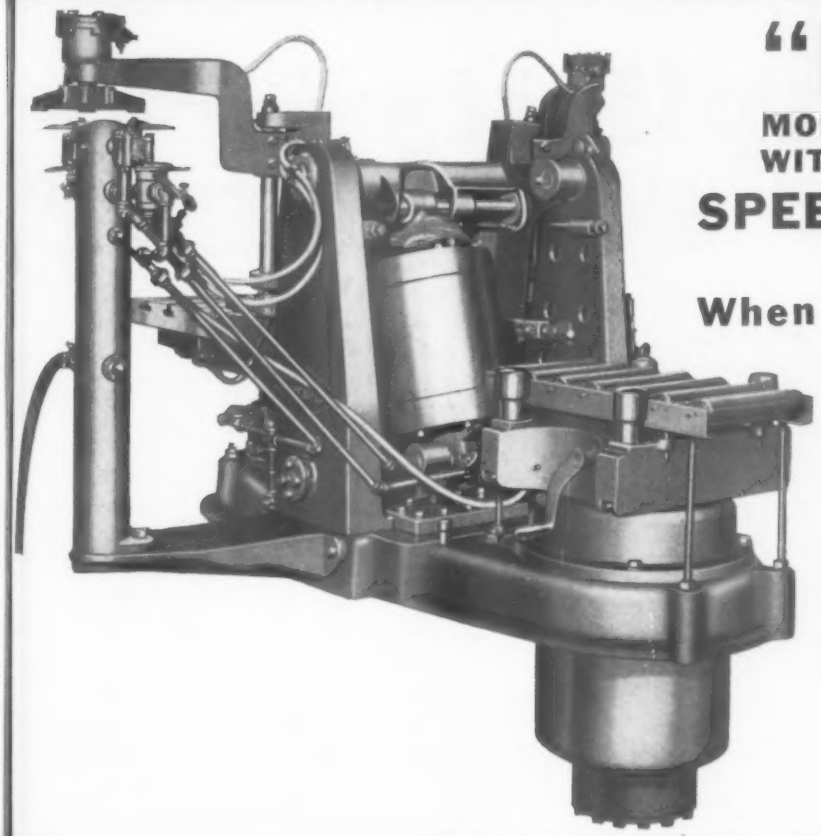
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES



"DAVENPORT"

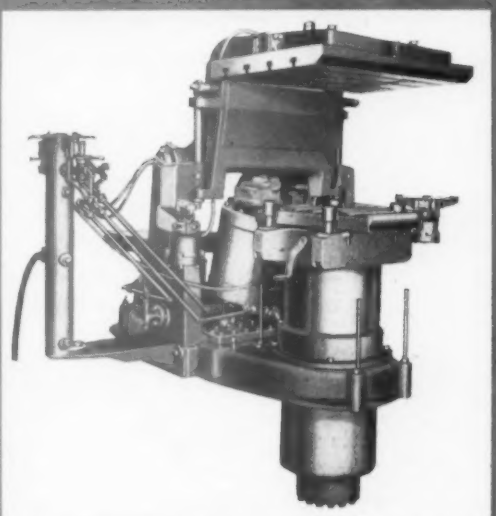
MODERN MOLDING MACHINES
WITH THE *New Adjustable Draw*

SPEEDS and SIMPLIFIES

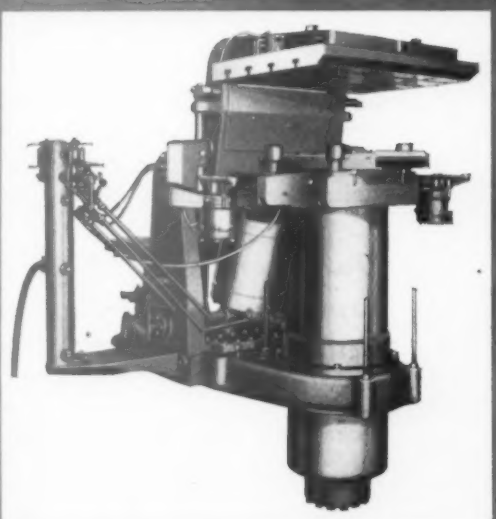
Adjustments

When making pattern changes

"DAVENPORT" Model 28 SA Rollover
Draw in beginning and ending position



"DAVENPORT" Model 5A Rollover
Draw adjusted for deep flask



"DAVENPORT" Model 5A Rollover
Draw adjusted for shallow flask

QUICK, FAST and EFFICIENT

Is the new Davenport molding machine adjustable draw.

Foundries can now change over flask sizes in a very few minutes with the new, highly efficient Davenport adjustable draw.

A convenient crank attached to the flask rest raises or lowers the rest to required flask depths. With this adjustable draw, changeovers require a minimum of lost time.

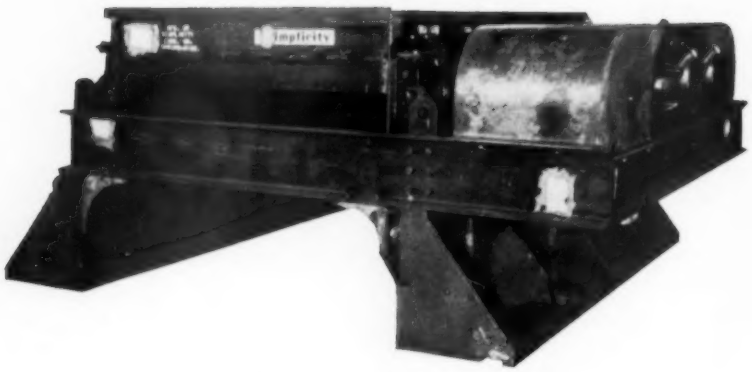
This Davenport adjustable draw is now available on any Davenport roll-over modern molding machine, either with or without conveyor attachment.

Write today and let us send you our new literature describing the Davenport new adjustable draw.

DAVENPORT MACHINE & FOUNDRY CO.

DAVENPORT IOWA, U. S. A

Simplicity
FOUNDRY EQUIPMENT



Portable 5′ x 8′ Dual Shake-out

PORTABLE SHAKE-OUTS

Many shops without conveyor systems cannot sacrifice production for the time required for such installations. The answer to this problem is to mount the Simplicity Shake-Out on I-beams or castings, like shown in the illustration, and use it as a portable unit. This gives at once the many advantages of speedier production with its saving in labor, flasks and general operating costs. The same shake-out can always be installed later in a permanent location. Many Simplicity Shake-Outs are being used as portable units, some mounted as shown, and others mounted on wheels. The largest portable shake-out is a Quad Unit on a car, which shakes out 150,000 lb. flasks.

PORTABLE SAND SCREENING UNITS

It is recognized that properly prepared sand is vital to securing good castings with a minimum loss. The shop desiring such prepared sand can use a Simplicity Sand Screen in their system. Where no system is available, the 2′ x 3′ Portable Screening and Conditioning Unit is being used with very great success to handle heap sand and the discharge from mullers. Where a greater capacity is desired, the 3′ x 6′ Semi-portable Unit has no equal in the work it will do. This unit is moved around the shop with a crane and fed with a clam shell. In both the 2′ x 3′ and 3′ x 6′ Simplicity units, the sand is screened through a fine mesh screen cloth, the lumps broken up by the breaker, the scrap and impurities removed, and the sand thoroughly conditioned, with the moisture evenly blended by the action of the screen and by the blades of the sand throwing unit, as they cut through the stream of sand and throw it out in a fluffy condition ready for the moulders. Users of these units report obtaining the finest sand ever secured.

Our recommendations are based upon experience gained from over 1600 operating units in various type foundries. Every Simplicity unit is fully guaranteed for the service for which it was recommended.

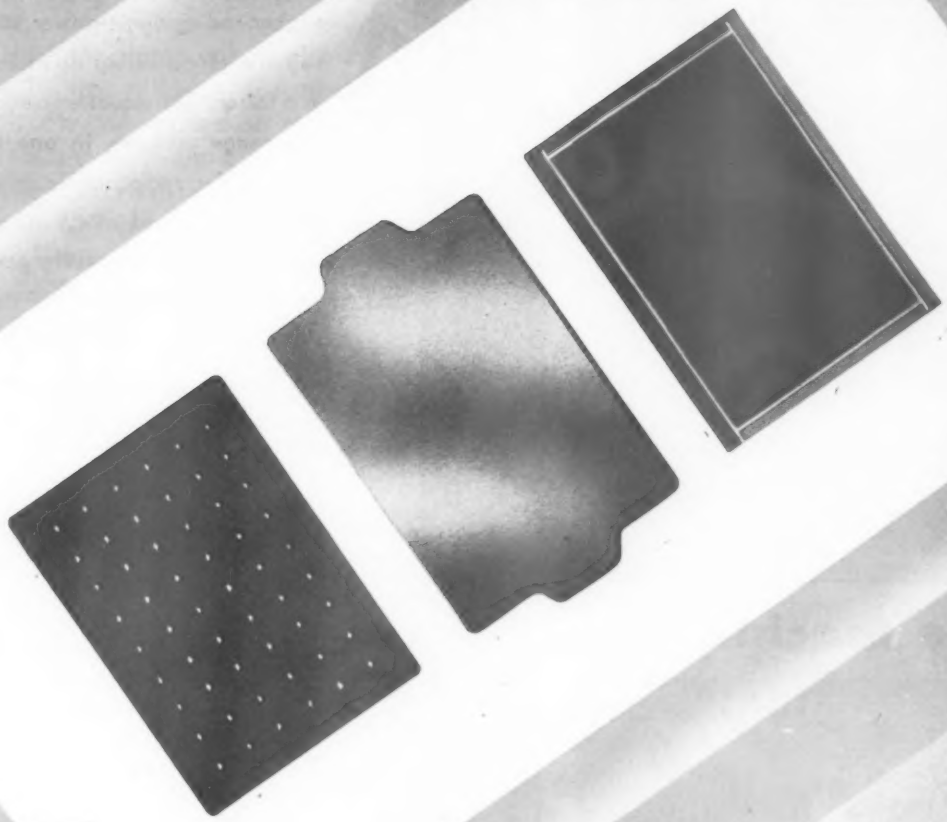
2′ x 3′ Portable Screening and Aerating Unit

Simplicity Engineering Company

DURAND, MICHIGAN

For Canada: Waterous Limited, Brantford, Ontario

FLAWLESS CASTINGS

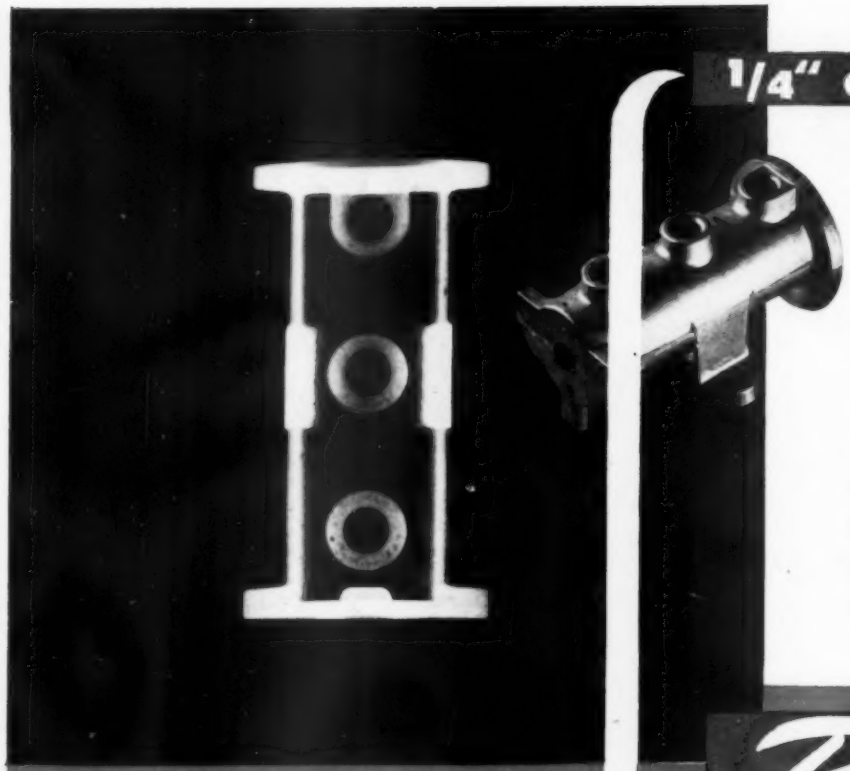


with MOLTRUP Steel Plates

Moltrup steel pattern plates, core plates and bottom plates have an outstanding record in production of flawless castings, which is another clinching argument for using the finest equipment—it pays in the end.

MOLTRUP

MOLTRUP STEEL PRODUCTS COMPANY · BEAVER FALLS, PA.
(PITTSBURGH DISTRICT)



1/4" aluminum

The Picker 250 KV Industrial X-Ray Unit combines mighty radiographic power with precision control capable of delivering its radiation in a trickle or in a torrent with equal efficiency. This flexible voltage range provides, **in one machine**, complete facilities for radiographic inspection and control of a wide spread of diverse materials, densities, and section thicknesses. The power which can strike through bronze and 4½" of steel (with screens), is delivered under such precise control that it can be applied with equal facility and accuracy to the inspection of quarter-inch aluminum alloys.

this one machine's *Range* **provides all**

First "E" Award in the X-Ray Industry

PICKER X-RAY CORPORATION
300 FOURTH AVENUE • NEW YORK 10, NEW YORK
WAITE MANUFACTURING DIVISION
17325 EUCLID AVENUE • CLEVELAND 12, OHIO

In this single Picker 250 KV X-Ray apparatus, many plants are finding the successful solution to the diverse problems encountered in an all-round radiographic inspection program. Its versatility of range is matched by its versatility of operation. The complete unit is available on a Mobile Chassis if inspection at different locations within the plant is required. Or it may be carried on a jib crane, or mounted on a dolly for heavy-duty work on boiler welds, pressure vessels, or similar massive objects. The entire tubehead-transformer assembly is so flexibly supported as to provide universal angulation in any plane, permitting rapid, accurate positioning in even the most awkward locations.

PICKER 250 KV INDUSTRIAL X-RAY EQUIPMENT

all-round facilities for x-ray inspection and control

30 KVP to 250 KVP

precise voltage control

accurately preset rigidly maintained

The Picker Control provides extremely close regulation of technique factors through a 100-step autotransformer and line voltage adjustor. An automatic timer with tube-use totalizer provides a timing range up to thirty minutes with fractional second subdivisions. Picker Bulletin No. 1144 gives complete specifications of this outstanding equipment. Write for it today.

Industrial PICKER X-ray

The practical value of X-Ray control and inspection has been so conclusively proven that new applications in new fields are daily developments. Your local Picker engineer can keep you in current touch with them . . . he's a good man to see, often!

RANSOHOFF WET CLEANING MILLS

Automatic Star-Return

IT'S IN THE STARS

SIDE-LOADING, SIDE-UNLOADING MILL

Close-up shows a side-loading, side-unloading mill with work and stars in place with most of the work buried for best cleaning results. Note the star-return gratings in the heads of the cleaning compartment. Castings being cleaned are malleable iron differential housings.

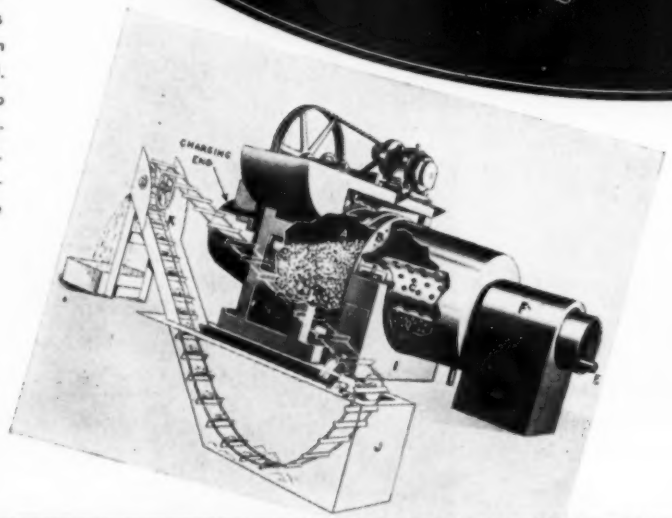
THE RANSOHOFF WET METHOD SAVES 30% to 70% ON YOUR CLEANING COSTS

MASS CLEANING BY THE RANSOHOFF WET METHOD

As illustrated, work is held in suspension in a moving mass of tumbling material confined in a revolving drum. As the drum revolves the work *cascades in and as a mass* in the tumbling material. Work is thoroughly scrubbed even into the most remote corners so that the entire surface of each casting is cleaned. Sharp corners are preserved and delicate designs in relief or indentation are left sharp and distinct.

SEND US A SAMPLE BATCH

Ransohoff Engineers will tell you how to clean quickly, thoroughly, economically.



BASIC DESIGN OF RANSOHOFF END-LOADING END-UNLOADING CLEANING MILL

- NO HEALTH HAZARDS
- NO DUST-COLLECTING SYSTEMS TO INSTALL
- NO DUSTY SAND
- NO MUDHOLES
- NO EXCESSIVE MILL WEAR

N. RANSOHOFF, Inc. CINCINNATI, OHIO · Township Ave. and Big 4 R. R.

The No. 612 with mold clamped in equalized position ready for rolling over and drawing pattern.

The No. 612 machine, rolled-over, showing the flask drawn from the pattern.

...For Work Requiring Absolute Accuracy in Ramming and Drawing

★ Newly introduced, this No. 612 portable, jolt, roll-over pattern draw machine is specially designed to meet present day foundry specifications . . . is ideally used in making the intricate cores and molds required in the aircraft and other precision industries.

This machine features an automatic air-operated clamp and equalizer. It is of open-end construction and is easily adjustable for flasks and core boxes of various sizes and heights. The No. 612 has a positive valve-less jolt, free from vibration and rebound, and two roll-over cylinders with oil dash pot control that assures smooth uniform operation.

Our fully descriptive catalog giving complete details of this and other Johnston & Jennings Molding Machines furnished gladly. Send for a copy.

THE JOHNSTON AND JENNINGS CO.
867 ADDISON ROAD • CLEVELAND 14, OHIO

A COMPLETE LINE PROVEN IN SERVICE INCLUDING—

PLAIN AIR JOLTS
in 12 different sizes

JOLT SQUEEZERS
fast sturdy machines—3 sizes

JOLT STRIPPING PLATES
4 sizes ranging up to 16" draw

JOLT, SQUEEZE, STRIPPING PLATE AND PATTERN DRAWS
Popular for medium service —2 sizes

PORTABLE JOLT ROLL-OVER AND PATTERN DRAW
A heavy duty thoroughly dependable machine—portable

JOLT ROLL-OVER AND PATTERN DRAWS
Fast large capacity machines with roll-out conveyors—4 sizes

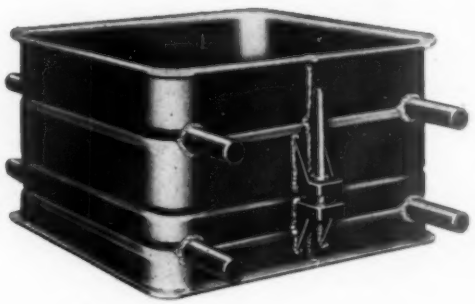
Write for fully descriptive catalog giving complete specifications.

Their Popularity Must Be Deserved

B. S. & B. PRESSED STEEL FLASKS are in ever increasing demand, taxing our production facilities to the very limit

LIGHT WEIGHT or HEAVY DUTY STYLES

Constructed for minimum weight with maximum strength and rigidity.



◆

All parts joined to form a single unit by our process of electric arc welding.

◆

Make inquiry of our closest representative or write to us direct. We are happy to assist with your problems.

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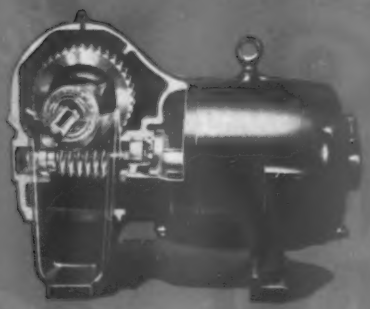
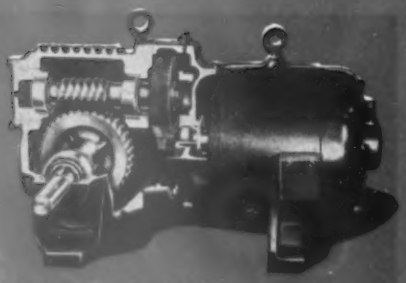
BLACK, SIVALLS & BRYSON, INC.

7500 E. 10th Street — Kansas City 3, Missouri

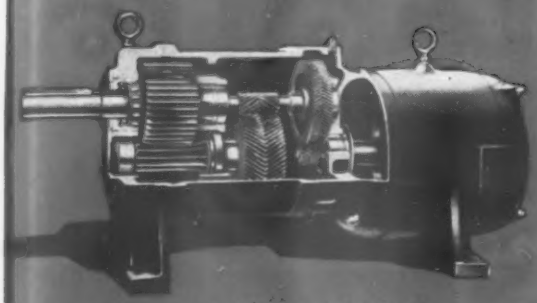


RIGHT ANGLE TYPE
RATIOS UP TO 72:1

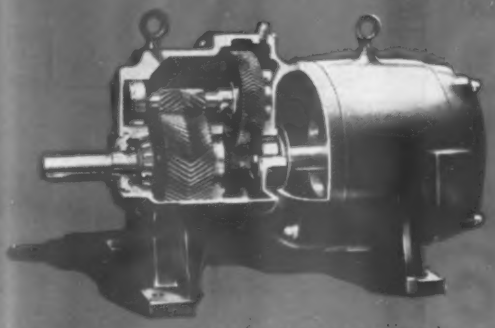


COMBINATION TYPE
RATIOS UP TO 432:1

MASTER GEARHEAD MOTORS



TRIPLE PARALLEL
RATIOS UP TO 120:1



DOUBLE PARALLEL
RATIOS UP TO 36:1

A COMPLETE LINE—Ratings from 1/10 to 100 Horsepower.

COST REDUCED by the elimination of bearings, couplings, chains and sprockets, gear trains or separate gear reducers —only one unit to mount—lower assembly costs.

COMPACTNESS—High reduction ratios secured in small space by using alloy steels, splined shafts and heat treated gears.

GREAT FLEXIBILITY—Master can readily modify either the motor or gear unit to fit exactly your individual requirements.

INTEGRAL CONSTRUCTION—In Master Gearhead Motors, both motors and gears are designed and built by one organization into a well balanced, clean cut power unit.

MOUNTS IN ANY POSITION — Master Patented Oil Seals and anti-friction ball and roller bearings as used in Master Gearhead Motors, permit the motor to be mounted in any position . . . horizontal, sidewall, ceiling or vertical with the gearhead either above or below the motor. However, the mounting position must be specified on the order so that proper oil gauges and vents may be arranged.

SIMPLIFIED DESIGN—More compact—less weight—permanent alignment—longer, reliable, trouble-free operation.

ANTI-FRICTION BEARINGS used throughout the entire unit.

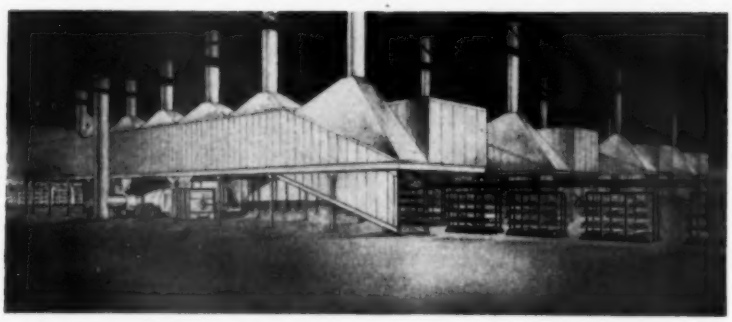
THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

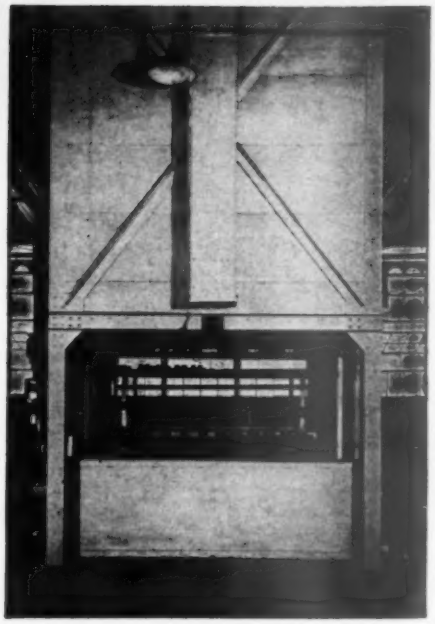
SINGLE PARALLEL
RATIOS UP TO 6:1

In face of wide competition....

CARL MAYER CORE and MOLD OVENS

...are chosen by concerns of national prominence!





Typical large Carl Mayer Vertical Oven as installed for General Motors, Electric Autolite, Cadillac and other outstanding foundries

4 OF THE LARGEST CONTINUOUS MONORAIL CORE OVENS INSTALLED IN U. S. A. FOR FORD MOTOR COMPANY

Each oven 170 feet long, utilizing 1200 feet of conveyor. Installations of this size indicate the confidence industry's leaders place in Carl Mayer creative engineering and "know-how"!

Wire or write for a Carl Mayer Oven Engineer, or Bulletin No. 141 for the most productive and economical solution of your core-baking problem.

THE CARL MAYER CORP.
3030 Euclid Ave., Cleveland, Ohio

Over 25 Years' Experience

All Types **CARL MAYER CORE AND MOLD OVENS** *All Sizes*

SERVING CONCERNS LIKE *these:*

Aluminum Co. of America
American Magnesium Corp.
American Radiator & Standard Sanitary Corp.
Babcock & Wilcox Co.
Bridgeport Brass Co.
Bucyrus-Erie Co.
Brown Industries Inc.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fort Pitt Steel Casting Co.
Frank Foundries Corp.
Fremont Foundry Co.
G & C Foundry Co.
General Motors Corp.
General Steel Castings Corp.
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International Heater Co.
Henry J. Kaiser Co. Inc
Packard Motor Co.
Shenango Penn Mold Co.
Studebaker Corp.
Whiten Machine Works
Whiting Corp.
A. C. Williams Co.

Take full advantage of

AIR POWER

CHIPPING

GRINDING

The applications of compressed air tools in a modern foundry are many. The following is a partial list of the uses of air in foundry work... check it.

- Chipping castings
- Grinding castings
- Sand ramming
- Air hoists, lifts, and motors
- Core breaking
- Wire brush cleaning
- Core blowing
- Sand blasting
- Sand sifting
- Spray guns for core and mold blacking
- Operating bumpers, squeezers and vibrators
- Blow guns
- Cupola blowing

Are you taking full advantage of your *air power* supply?

As the largest manufacturer of compressed air machinery, we offer you a complete line of compressors and air tools. Our engineers are available to help you make the best selection.

RAMMING

HOISTING

8-457

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Ingersoll-Rand

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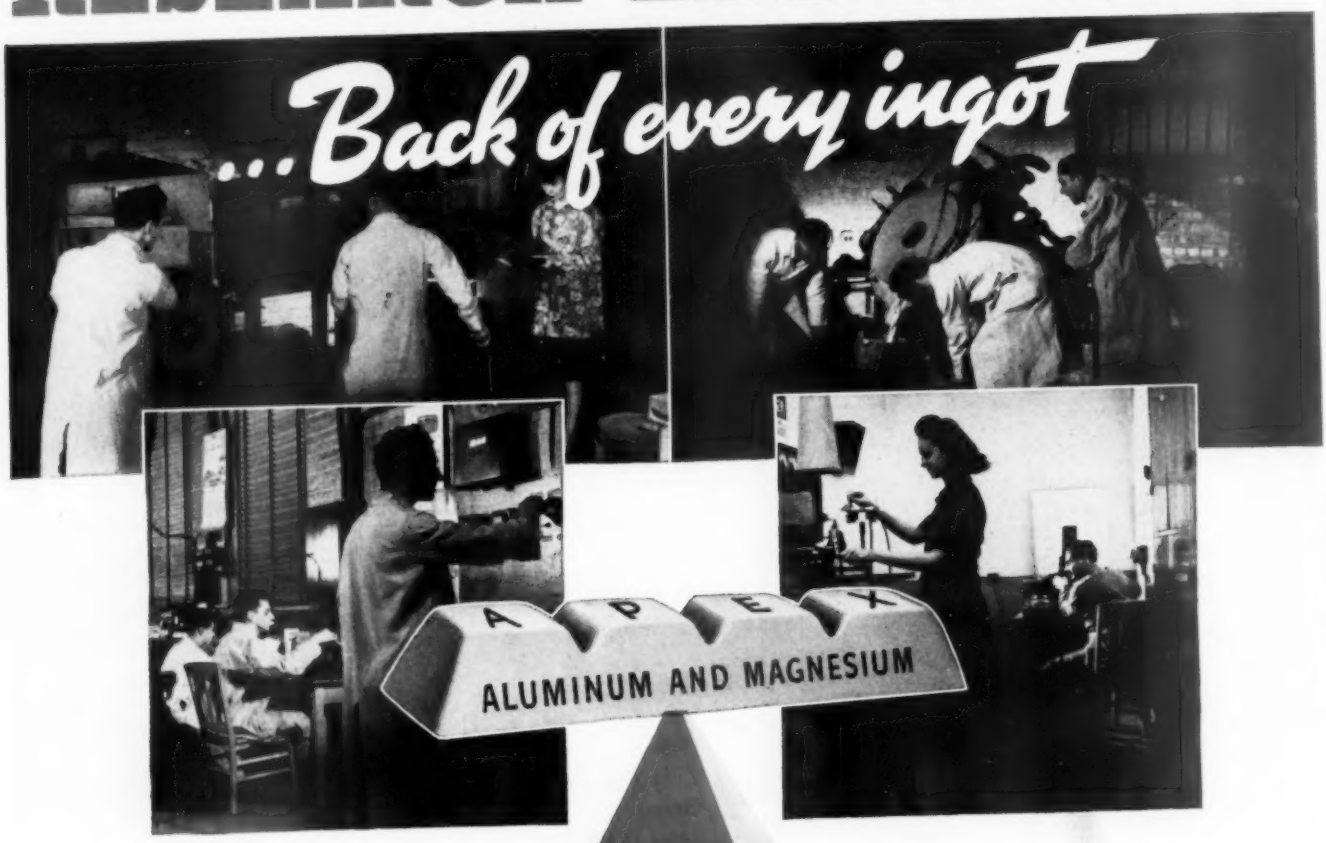
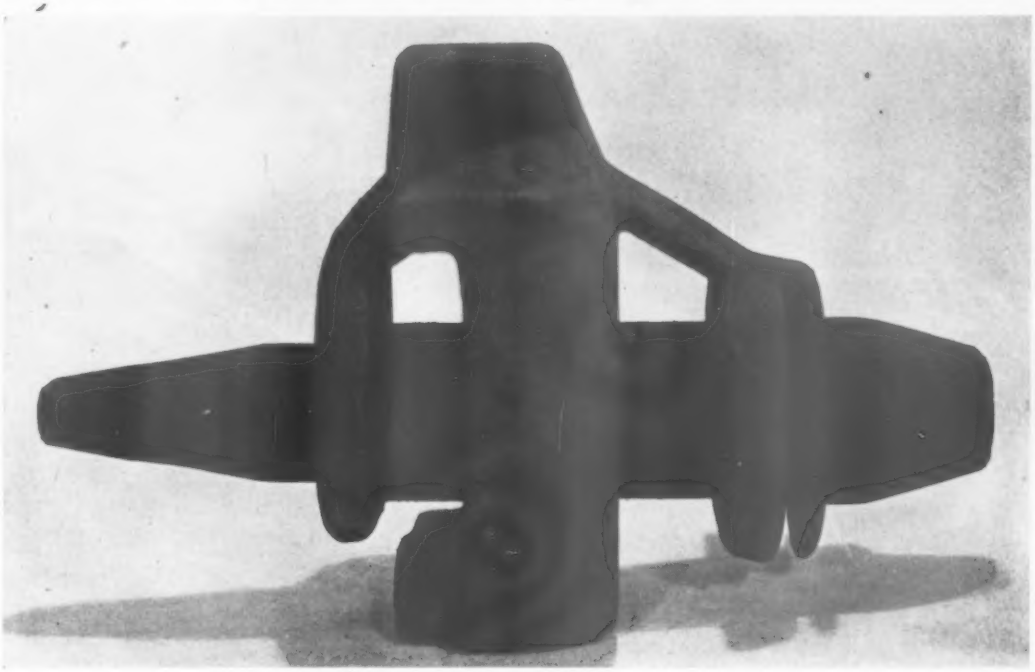
RESEARCH LEADERSHIP



APEX SMELTING COMPANY

CHICAGO 12, ILLINOIS

Lion Binder with Core Oil



Lion Binder is an ideal partner of compounded core oils and of Linseed Oil, for many types and classes of cores. All of the advantages of both are retained when both binders are used in the same core.

Experience shows that excellent cores are made by using Lion Binder and Oil in equal parts, or two parts of Lion Binder and one part of Oil.

Lion Binder is invaluable in oil sand cores, because it helps keep the oil evenly distributed throughout the core during baking, producing a core of uniform strength throughout.

Lion Binder and Oil Cores have these advantages

Low Binder cost
Clean well from core box
Bake in short time
Have good dry strength
Have good surface hardness
Have sharp edges
Have low expansion and contraction
Are stable to heat shock
Have good hot strength
Clean easily from casting
Controls collapsibility

Lion Binder and Oil produce important cores for

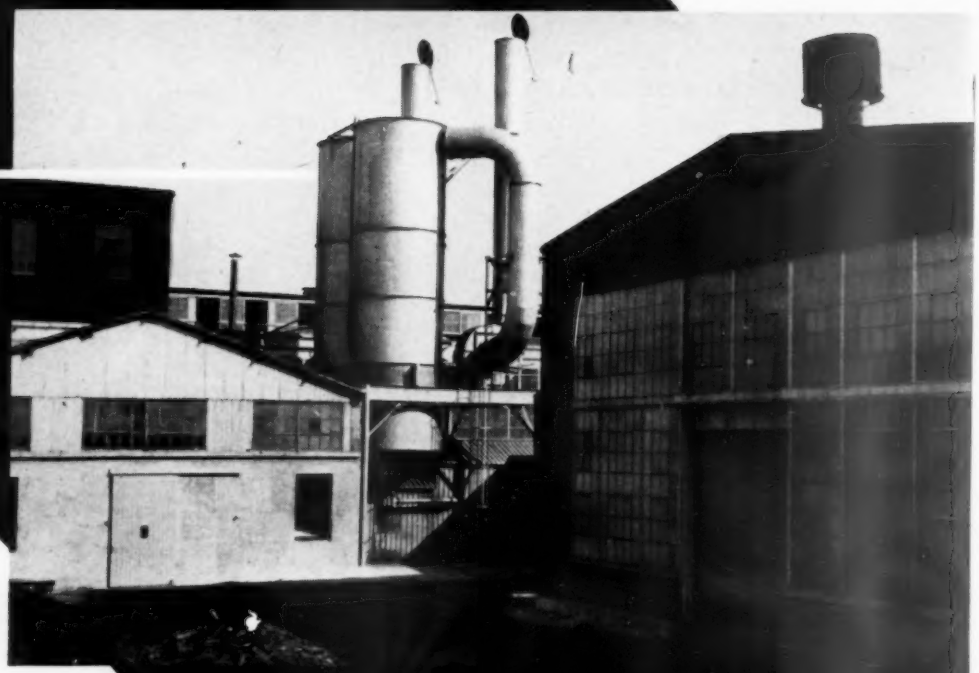
Turbines
Diesel Engines
Pumps
Automobile Parts
Steel Projectiles
Bronze Bushings
Meehanite Castings
Aluminum Castings
Locomotives
Malleable Castings

LION BINDER IS MADE ONLY BY

J. S. McCORMICK CO.

PITTSBURGH, PA.

Schneibles get all the dust



CLEANER air in the foundry results in better castings, increased production and greater worker efficiency.

When you install a Schneible Multi-Wash System, your dust collection worries are over. Schneibles operate continuously with no attendance other than occasional sludge removal. Water (oil for magnesium foundries) is used over and over again to wash all dust and fumes from the air. There is nothing about the equipment to break, burn, clog or rapidly wear.

Schneible equipment is available in standard units to meet the dust and fume control needs of every foundry — ferrous or nonferrous — and to maintain clean air throughout the plant or relieve troublesome individual operations, such as the shake-out pictured at right. Here a Schneible "Uni-Flo" Hood removes dust and fumes without creating eddy currents. *Write for informative bulletins.*

from **Sand preparation**
Shake-out
Cleaning
Grinding

At top: Two Schneible 30,000 c.f.m. Multi-Wash Collectors keep the air clean throughout this large St. Louis foundry; *another Amsco installation.*

Above: Typical "Uni-Flo" Hood installation at a shake-out in Amsco's St. Louis plant.

CLAUDE B. SCHNEIBLE CO.

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Engineering Representatives in Principal Cities

SCHNEIBLE

DUST, ODOR AND FUME CONTROL EQUIPMENT

There's a Hidden Gold Mine in your USED CORE WIRE!

RECLAIM IT WITH KANE & ROACH CORE WIRE STRAIGHTENERS

Savings up to $150 a month are often reported by enthusiastic users of Kane & Roach Core Wire Straighteners! Don't neglect this hidden source of cash! Your used wire—even if it's badly bent—can be restored over and over again with these fast-working, economical machines. Now—when conservation of all metal is a vital factor in war-industry, Kane & Roach Straighteners fulfill a more important need than ever. Kane & Roach machines not only save valuable core wire but they pay for themselves so fast that scores of foundrymen have reordered as many as three or four after a short trial of one.

Here's Why Kane & Roach Is Your Best Bet!

There's an excellent reason why Kane & Roach Straighteners are in such demand—that's because they're built to do a long-term heavy-duty job, and do it better, faster and cheaper. This claim is substantiated by foundrymen everywhere—who know and rely on Kane & Roach, the company that has specialized in designing and building high-quality straighteners for the steel industry since 1887. You owe it to yourself and to the industry to invest in a K&R machine for superior straightening of badly-needed core wire.

The NEW K & R CORE WIRE STRAIGHTENER

Works Better, Lasts Longer, because . . .

- 3 ADDITIONAL straightening rolls plus the pinch rolls, all of hardened steel.
- Roll gears are cut-steel, hardened.
- Drive gears run in oil.
- Maximum safety—guard encloses all moving parts.
- Pressure-release cam handles prevent jamming.
- Motor drive shielded from grit.
- Cabinet base encloses and protects sturdy, high-power motor.
- Extraordinarily long wear for all parts.
- Cut-off can be furnished for straightening and cutting new wire from the coil.

Cash in NOW! Send today for our new circular 58-B—the first step to savings.

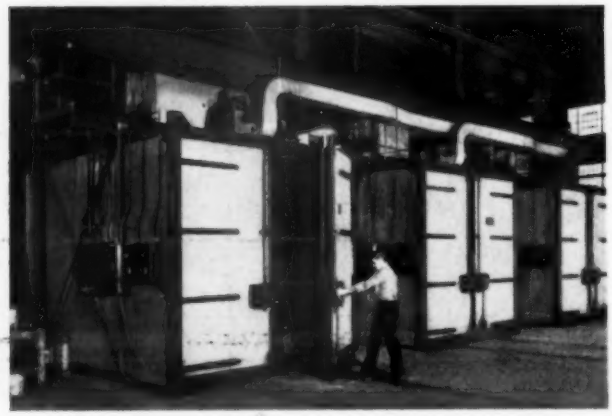
KANE & ROACH, Inc., Syracuse, N. Y.
I want to know more about K&R new core wire straighteners. Send me Bulletin 58-B, without obligation. My sizes of wire are: .....
Company .....
Individual .....
Street .....
City and State .....

KANE & ROACH
SHONNARD AND NIAGARA STS.
SYRACUSE, N. Y., U.S.A.

These Important Features of

GEHNRICH OVENS

ASSURE FASTER, MORE UNIFORM HEATING AND ECONOMY IN FUEL—TIME—SPACE



Three large Gehnrich car type core and mold ovens, each with a Gehnrich gas fired external air heater, complete recirculation system and temperature control with power, heating, temperature limit and ventilation systems interlocked to protect baking quality and operating safety. Each oven handles 15,000 lbs. of sand per batch. This prominent foundry also uses two Gehnrich rolling drawer ovens, two truck loading ovens and an additional large car type mold oven.

CONTROLLED RECIRCULATION HEATING

Applied to meet the individual requirements of mass, variety and size of cores or molds. Correct utilization of oil, gas or electricity, coordination of heat generation and distribution and continuous large volume air recirculation systems and interlocking of temperature control heat supply and ventilation systems produce uniform heating conditions within close temperature limits. This effects fast, thorough heat penetration and drying of the work from the inside out, making cores and molds firm and strong.

"DUAL PANEL" OVEN CONSTRUCTION

This unique insulated steel panel assembly provides unusual structural strength and free expansion under heat without buckling. No through metal in walls, roof or doors means no heat conduction and fuel waste, and faster heating up.

"Dual Panel" Ovens are easy to erect, enlarge, rearrange, move and reassemble to suit changing foundry conditions. Heavy structural members inside and outside, doors and locking mechanisms assure all possible protection against mechanical damage and provide operating safety.

A TYPE FOR EVERY HEATING NEED

In any size—for any capacity; batch loading or continuous—cabinet, shelf, rolling drawer, truck, rack, car, conveyor or tower ovens, for any fuel—for better, more economical production. These ovens are also used for metal heating and baking finishes.

Get our recommendations for your foundry

General Electric Co.
Blaw-Knox Co.
Baldwin Locomotive Works
Waterbury Farrell Foundry Co.
The Bullard Co.
Bethlehem Steel Corp.
Otis Elevator Co.
Wright Aeronautical Corp.
Jenkins Brothers
Crane Company
Gifford-Wood Co.
Farrell-Birmingham Co.
Crompton & Knowles Loom Works
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DISCOVER WHAT THESE TYPICAL USERS LEARNED ABOUT GEHNRICH OVEN PERFORMANCE

GEHNRICH OVEN DIVISION

W. S. ROCKWELL COMPANY

Batch Type and Conveyor Ovens • Oil - Gas - Electric - Steam - Coke

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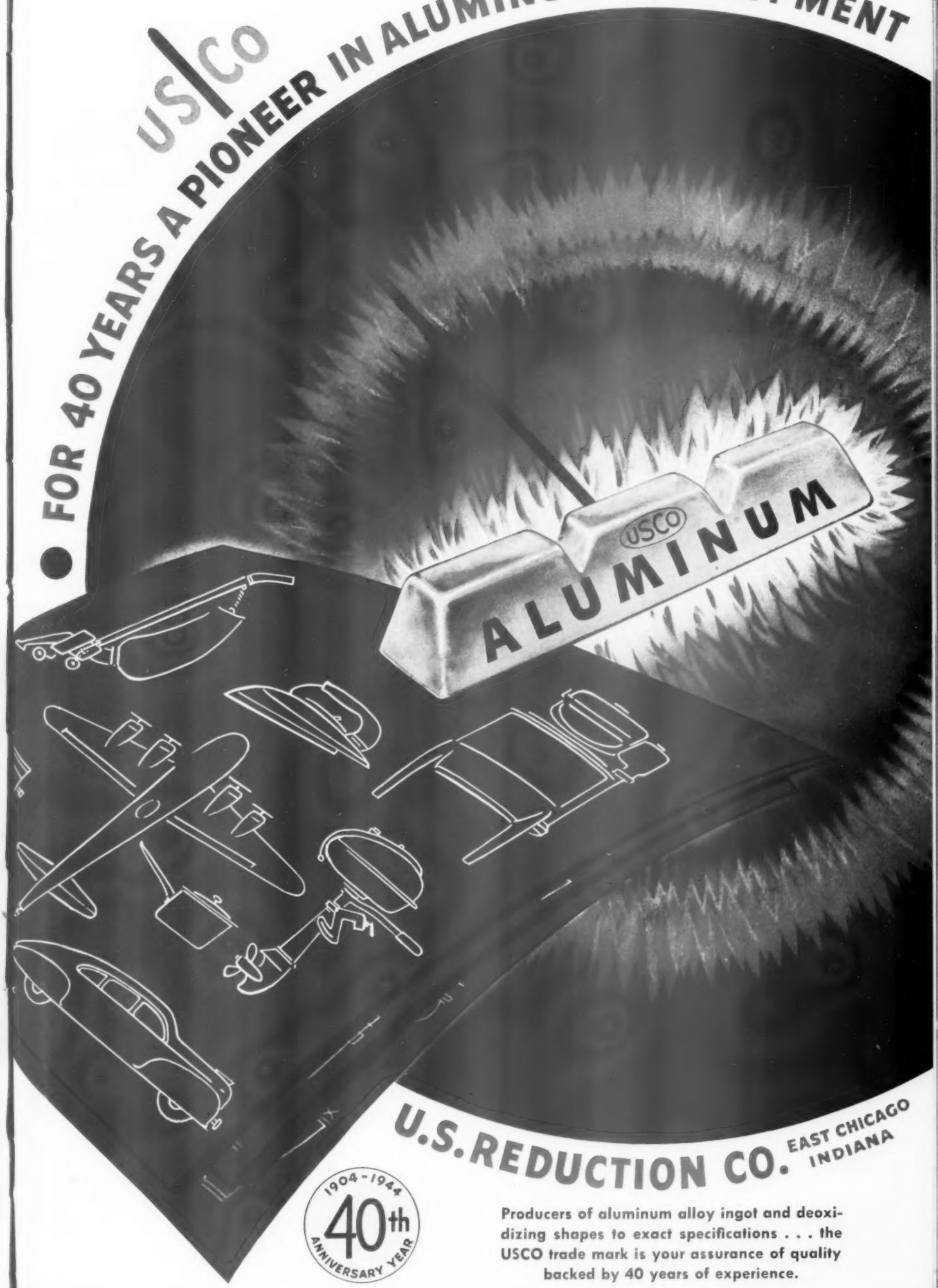
USCO

FOR 40 YEARS A PIONEER IN ALUMINUM DEVELOPMENT



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1904 - 1944
40th
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Producers of aluminum alloy ingot and deoxidizing shapes to exact specifications . . . the USCO trade mark is your assurance of quality backed by 40 years of experience.

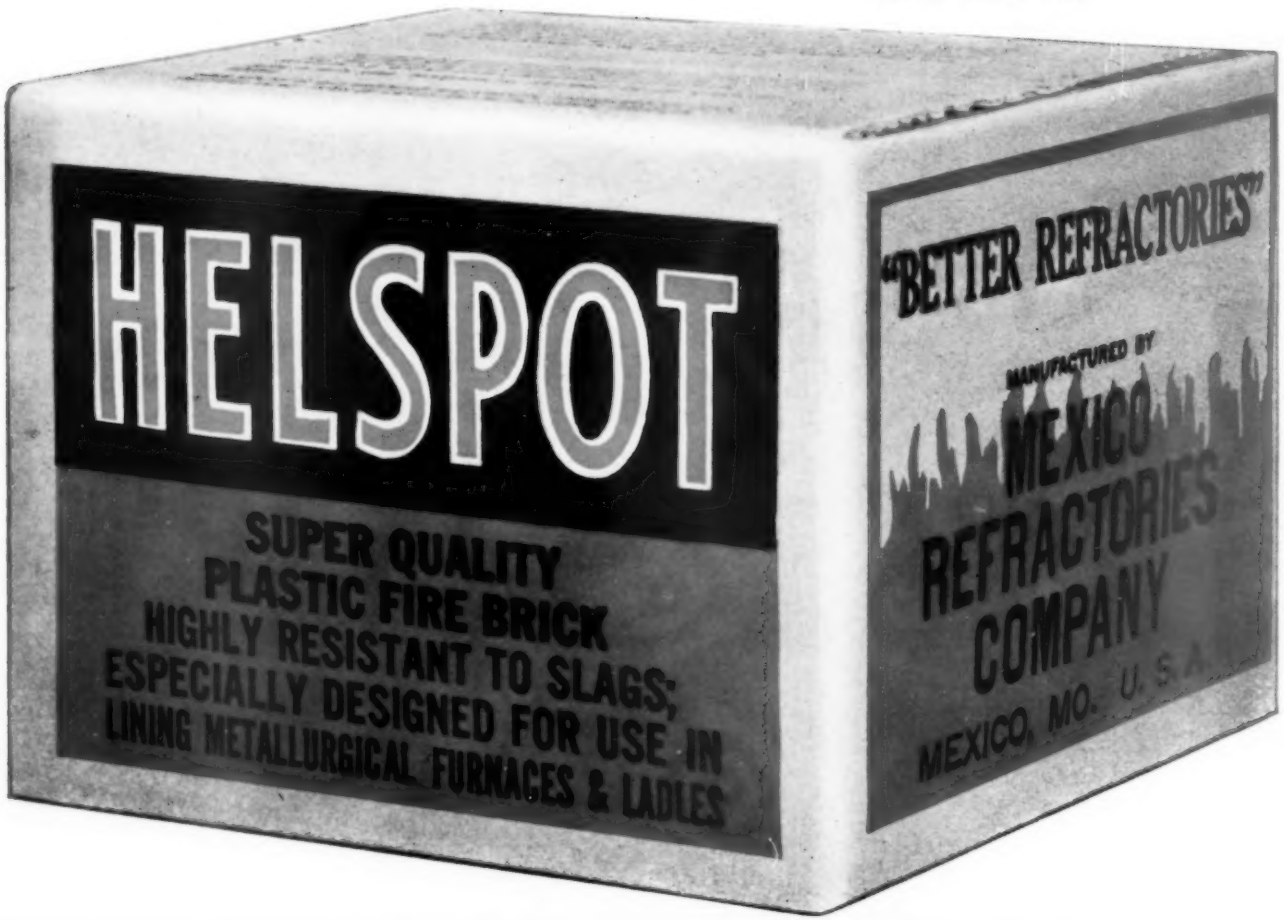
Reduce Your Ladle-Lining Costs

HELSPOT — an improved, ready-to-use ladle lining refractory — is easy to install, will increase the service life of your ladles, and shorten relining time.

In addition, the use of HELSPOT will result in cleaner ladles; metal flows without slagging or sticking; troublesome skulls and bridging are reduced. Therefore, more perfect castings, and fewer rejections.

HELSPOT is shipped in 100-lb. water-proof cartons, sliced in six convenient slices; also 500-lb. steel drums.

Write for Bulletin 1106.



HELSPOT

SLAG RESISTANT MONOLITHIC LADLE LINING

Manufactured by

MEXICO REFRACTORIES COMPANY

MEXICO, MISSOURI, U. S. A.

SAFER! ...POSITIVE UNBREAKABLE CONNECTION

TO CONNECT, place ends together, push and twist —they're locked.
TO DISCONNECT, simply pull back sleeves . . .
jaws open automatically.

Thor

"PERFECT" AIR HOSE COUPLINGS

Positively locked connection that won't break or come apart.

Greater safety — couplings cannot separate even if one lock becomes caught on something.

Truly universal—no right or left, male or female hose ends. Interchangeable in all sizes to ¾".

Longer life — they're made of alloy steel, heat treated for extra durability; specially processed to prevent rusting.

Quicker operation—disconnect by a simple pull on sleeves; connect by a straight push and slight twist.

EXCLUSIVE DESIGN ASSURES POSITIVE-LOCK CONNECTION

Job-proved tests every day in scores of shops are demonstrating the *greater safety* of Thor "Perfect" Air Hose Couplings.

The ingenious, simple design of Thor Air Hose Couplings provides a positive, unbreakable connection . . . yet one that can be locked and unlocked quickly.

Thor "Perfect" Air Hose Couplings, stocked and sold by leading mill, marine and foundry supply distributors everywhere, can help you do countless air tool jobs *faster . . . safer!* Fill out the coupon below and ask for a demonstration *today.*

Thor *Portable Pneumatic and Electric Tools*

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Gentlemen:
Please arrange to have your representative call for a demonstration of Thor "Perfect" Air Hose Couplings.

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YES- BLAW-KNOX HAS THE BUCKET YOU WANT!

Choose a bucket designed for your particular job. From literally scores of types and sizes, which make the Blaw-Knox line of buckets so complete, we illustrate six typical applications.

1. Blaw-Knox Two Line Hook-on Type Bucket. Size 735-02 (rated 3 cubic yard). Open Hearth service. Weight 20,350 lbs. *Ask for Catalog No. 2002.*
2. Blaw-Knox Single Line Hook-on Type Bucket. Size 3201 (rated 2 cubic yard). Open hearth limestone to charging boxes. Weight 18,600 lbs. *Ask for Catalog No. 2002.*
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4. Blaw-Knox Single Line Hook-on Type Bucket. Size 0-3100 (rated 1¼ cubic yard). Steel Foundry service. Weight 4100 lbs. *Ask for Catalog No. 2002.*
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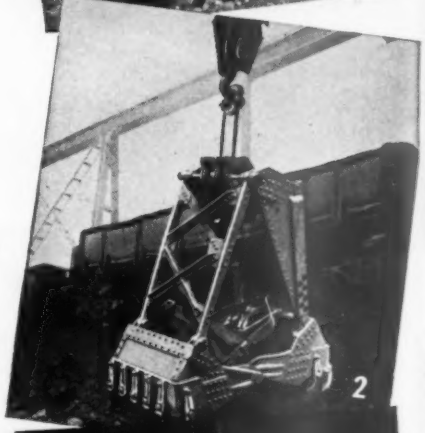
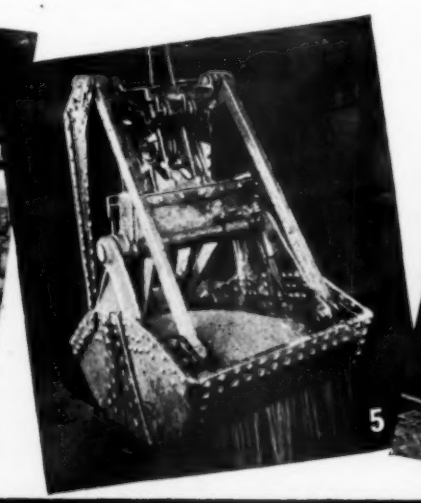
6. Blaw-Knox (25 net ton) four-line symmetrical design Ore Bucket. Weight 49,000 lbs. *Ask for Catalog No. 1865.*

Other Blaw-Knox Catalogs describe and illustrate complete steel plant bucket applications.





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of Blaw-Knox Company
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BLAW-KNOX BUCKETS

WHAT AJAX SIGNIFIES

AJAX METAL COMPANY

AJAX NON-FERROUS INGOT METALS: The first program for scientific control of ingot metal production was set up in and by the Ajax Metal Company 45 years ago. The result continues to be a sense of sureness and satisfaction in all the dealings of foundrymen with this company. **Philadelphia, Pa.**

AJAX ELECTRIC FURNACE CORP.

Division of Ajax Metal Co.

AJAX-WYATT INDUCTION MELTING FURNACES: Virtually all the brass mills in North America use these furnaces because they have the lowest metal losses in the field—less than 1%—with superior temperature control and unapproached economy of operation on high production schedules such as we have today. **Philadelphia, Pa.**

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HIGH-FREQUENCY MELTING AND HEATING: Development of high frequency melting and induction heating as early as 1916 represents a basic contribution of Ajax research to metallurgical art. Use of Ajax-Northrup units is the trend in melting high alloy tool steels, magnet steels; for centrifugal castings; and heating for hot-forming. **Trenton, N. J.**

AJAX ELECTRIC CO., INC.

Division of Ajax Metal Co.

AJAX-HULTGREN SALT BATH FURNACES: Over a thousand of these furnaces have been installed. For practically every heat-treating operation from 300° F. to 2400° F., the Ajax-Hultgren Electric Salt Bath Furnace has definitely proved its advantages and received the acclaim of leading metallurgists throughout the world. **Philadelphia, Pa.**

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ALUMINUM MELTING FURNACES: Advantages inherent in the original Ajax-Wyatt low-frequency melting principle and design are found in the Ajax-Tama-Wyatt furnace, incorporating original and specific features for aluminum melting, permitting production of homogeneous alloys with diminished oxidization and no danger of overheating or underheating. **Trenton, N. J.**

SINCE 1880

The 12"-38" Adams Jolt Squeezer, Portable Type

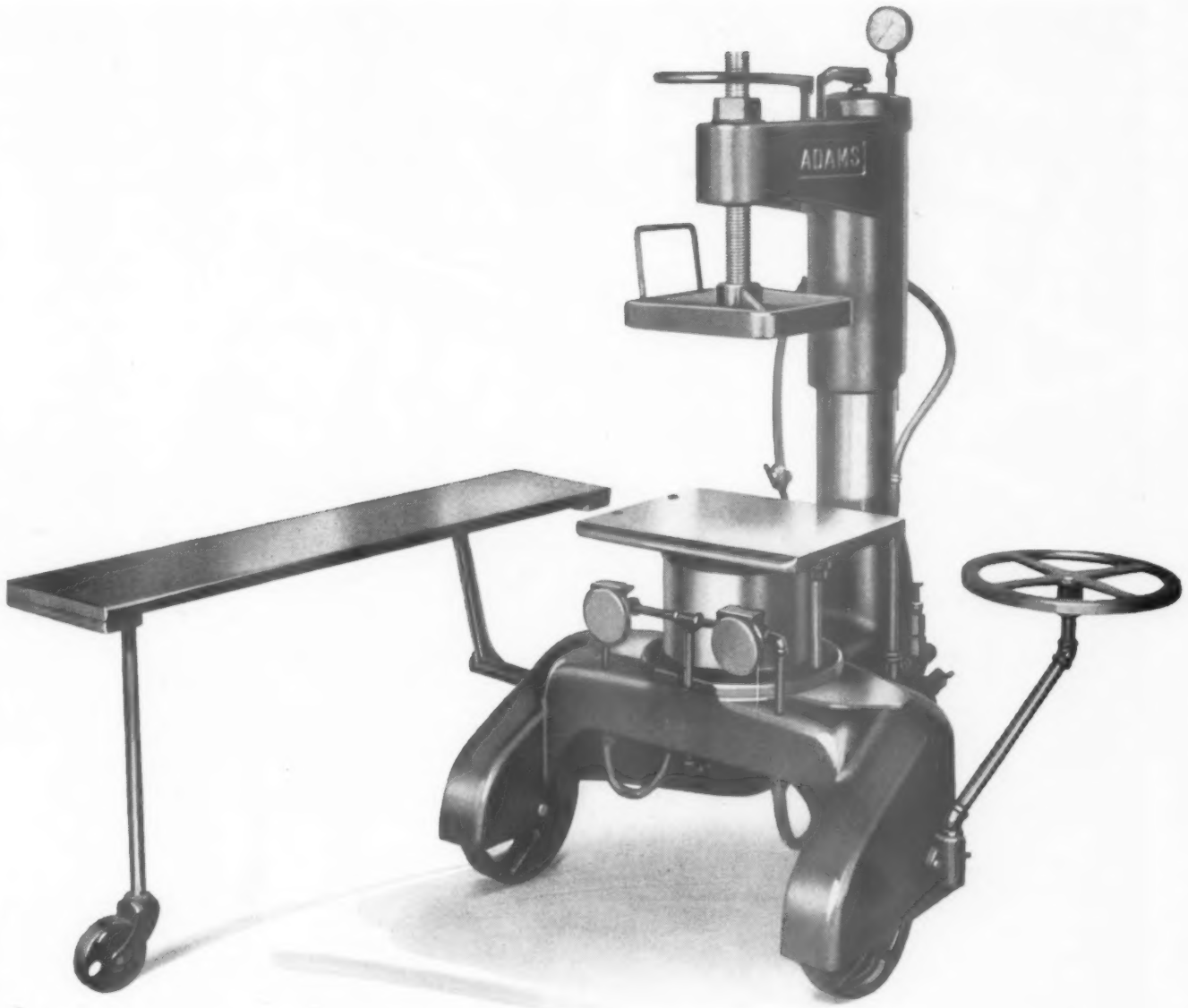
Make Your Selection From This List—

SIDE ROD TYPE PORTABLE OR STATIONARY	Squeeze Piston diameter	Jolt Piston diameter	Clearance between Side Rods	Pattern Draw, Adjustable
10"-32" Jolt Squeezer	10"	4"	32"	
12"-38" Jolt Squeezer	12"	5"	38"	
16"-42" Jolt Squeezer	16"	6"	42"	
10"-32" Universal Jolt Squeezer	10"	4"	32"	3" to 6"
12"-38" Universal Jolt Squeezer	12"	5"	38"	3" to 6"

Also Adams Hand Squeezers —30", 34" or 38" between side rods—Portable or Stationary.

THE ADAMS COMPANY

MOLDING MACHINES · FLASK



The 10" Post Type Universal Squeezer, Portable Type

Adams Molding Machines

POST TYPE
PORTABLE OR STATIONARY

	Squeeze Piston diameter	Jolt Piston diameter	Pattern Draw, Adjustable
10" Post Type Jolt Squeezer	10"	4"	
12" Post Type Jolt Squeezer	12"	5"	
10" Post Type Universal Jolt Squeezer	10"	4"	3" to 6"
12" Post Type Universal Jolt Squeezer	12"	5"	3" to 6"

Also manufacturers of Snap Flasks, Slip Flasks, Jackets, Bands, Presser Boards, Bottom Plates, Upsets, Match Frames, Tubular Sprue Cutters and Vibrators.

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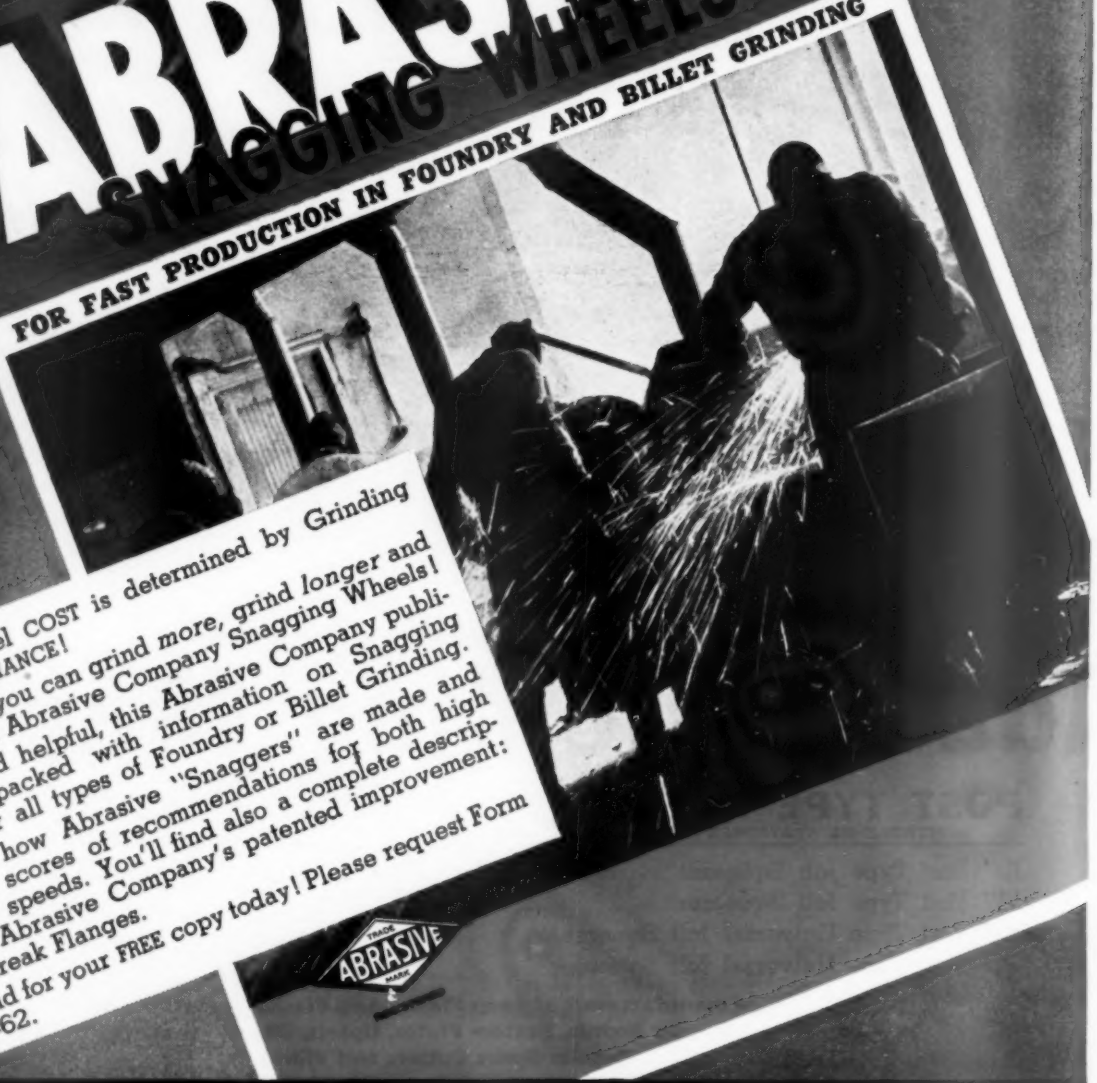
FOR FAST PRODUCTION IN FOUNDRY AND BILLET GRINDING



Grinding Wheel COST is determined by Grinding Wheel PERFORMANCE!

Learn how you can grind more, grind longer and for less with Abrasive Company Snagging Wheels! Handy and helpful, this Abrasive Company publication is packed with information on Snagging Wheels for all types of Foundry or Billet Grinding. It tells how Abrasive "Snaggers" are made and suggests scores of recommendations for both high and low speeds. You'll find also a complete description of Abrasive Company's patented improvement: Red Streak Flanges.

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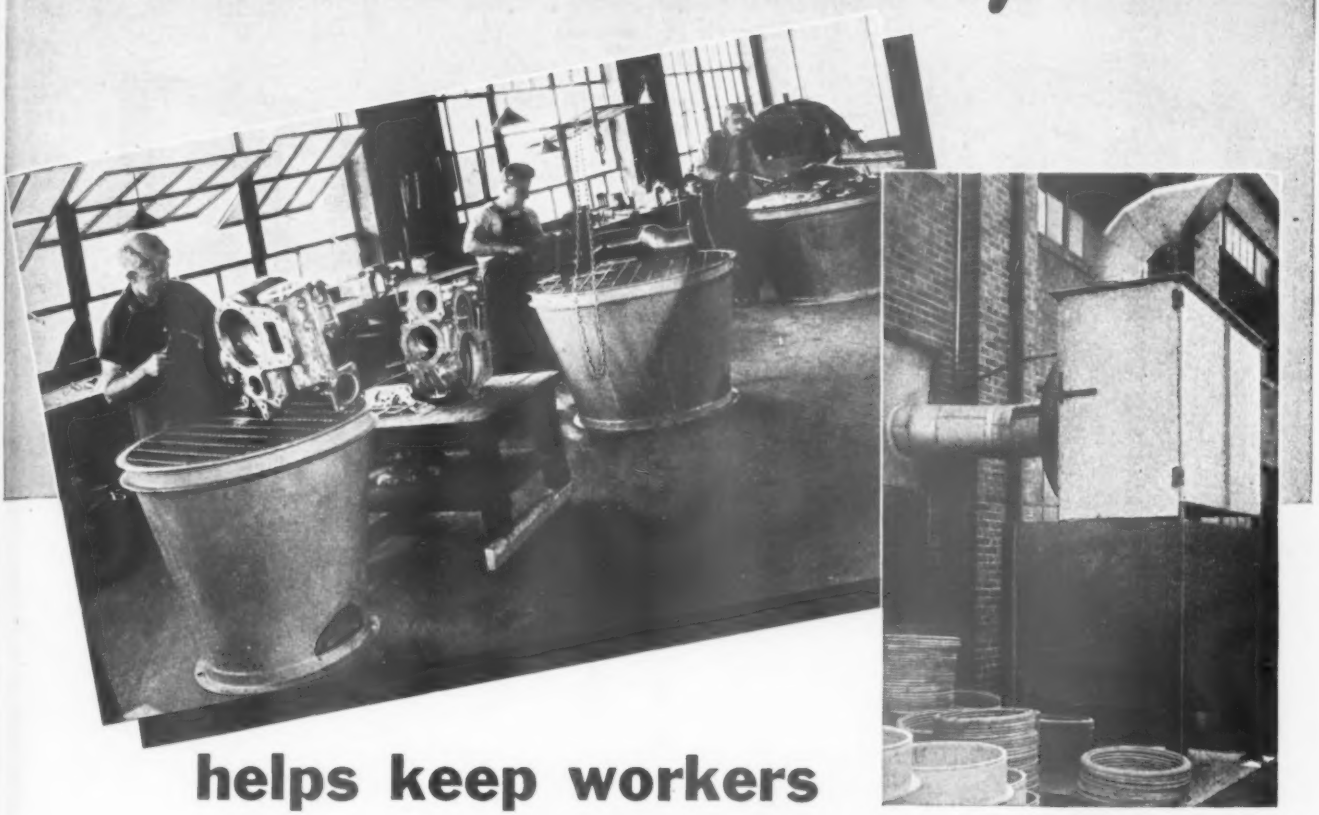
KIRK & BLUM *down-draft*
DUST CONTROL *System*



helps keep workers on the job at FIRE ENGINE plant

At the Seagrave Corp., Columbus, Ohio, this Dust Control System, comprising two four ft. diameter tables and one three ft. diameter table (as shown in above illustration) keeps dust below breathing level of workers.

Tables are located to give ample working space between stations. Air enters from the rear of workers and is drawn over their shoulders downward through gratings on tables into under-the-floor ducts where it is exhausted outside of building by a Rotoclone handling 6400 cubic feet of air per minute. This unit is of such capacity to handle additional air when found necessary.

This installation was designed to take into consideration the individual requirements, such as limited floor space and to utilize the monorail located directly above the 3 down draft tables, handling the parts of engines to be machined, much of which grinding is done by hand.

Kirk & Blum Engineering Staff makes a thorough analysis of your special dust or fume control problem, and makes recommendations based on more than 37 years of specialized experience. For details write

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WRITE for these BOOKLETS:

"DUST COLLECTING SYSTEMS IN METAL INDUSTRIES"
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"DATA ON KIRK & BLUM PRODUCTION FACILITIES"

KIRK AND BLUM

Combs GYRATORY FOUNDRY RIDDLES

HERE they are . . . as exhibited in action at the Foundry Show in Buffalo!

Type "CR" . . . . . .

FOR SCREENING . . . Moulding and Core Sands Medium Fine, Coarse Dry and Sticky Materials.

24" dia. Sieve is held in place by a perfected clamping device. . . . Sieve is easily removed, dumped and replaced in about five seconds. . . . . This machine has a capacity of at least 20 men riddling by hand. Special Vertical ⅓ R. P. geared head motor, totally enclosed, operates machine at about 287 R. P. M. . . . This slow motion, together with about 3" circle of gyration, thoroughly SIFTS, MIXES, AERATES and FLUFFS the sand. . . . Capacity equal to at least 20 men riddling by hand. . . . Dust-proof ball bearings are used. . . . Height 4'-6" overall. Weight 260 pounds.

Price complete $215.00

Type "V" . . . . . .

FOR SCREENING . . . Moulding and Core Sands, Medium Fine and Coarse Dry Materials. 20" dia. Sieve is held in place by a perfected clamping device.

This permits removing and replacing sieve in about five seconds.

This machine has a capacity equal to 10 men riddling by hand.

Driven by a Special 1/6 H.P. totally enclosed motor equipped with ball bearings. Merely plug in on any light or power circuit.

5 feet high over all.

Weighs 100 pounds, making it possible for one man to carry it from place to place. Also made with 36" dia. Sieve, this being our type "V-5".

Price complete, Type V $175.00
Price complete, Type V-5 . . . $310.00

Extra Screens Save Money

Rims are made of heavy steel. Bottoms of extra heavy galvanized after woven wire cloth.

Type "CS" . . . . . .

FOR SCREENING . . . Moulding and Core Sands Medium Fine, and Coarse Dry Materials.

24" Square Sieve. . . . Machine makes two separations. . . . Screened material passes through the sieve and refuse tails off to one side. . . . No need to dump sieves. . . . Permits of continuous shoveling. . . . Special vertical geared head motor, ⅓ H. P., totally enclosed, operates machine at approximately 287 R. P. M. . . . Has about 3" circle of gyration, which thoroughly SIFTS, MIXES, AERATES and FLUFFS the sand. . . . Capacity equal to at least 20 men riddling by hand. . . . Dust-proof ball bearings used. . . . Height 4'-10" overall. Weight, 304 pounds.

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What's a Close Tolerance Pattern?

. . . a Pattern Engineered for Dimensional Accuracy for Practical Production at Lowest Cost!

A Buffalo Pattern

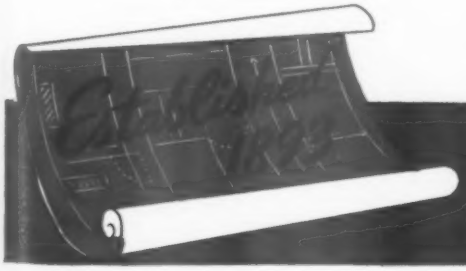
● When close dimensional limits are an essential casting requirement—there's no margin for error! That's why for over fifty years the Buffalo Pattern Works has been designing and building patterns that measure up to—or exceed—specification standards.

Then too, Buffalo Pattern Works' skill and wide experience with metals, structural design and practical fabrication assure you of patterns that will produce metallurgically correct castings at low production costs.

Write Dept. C.

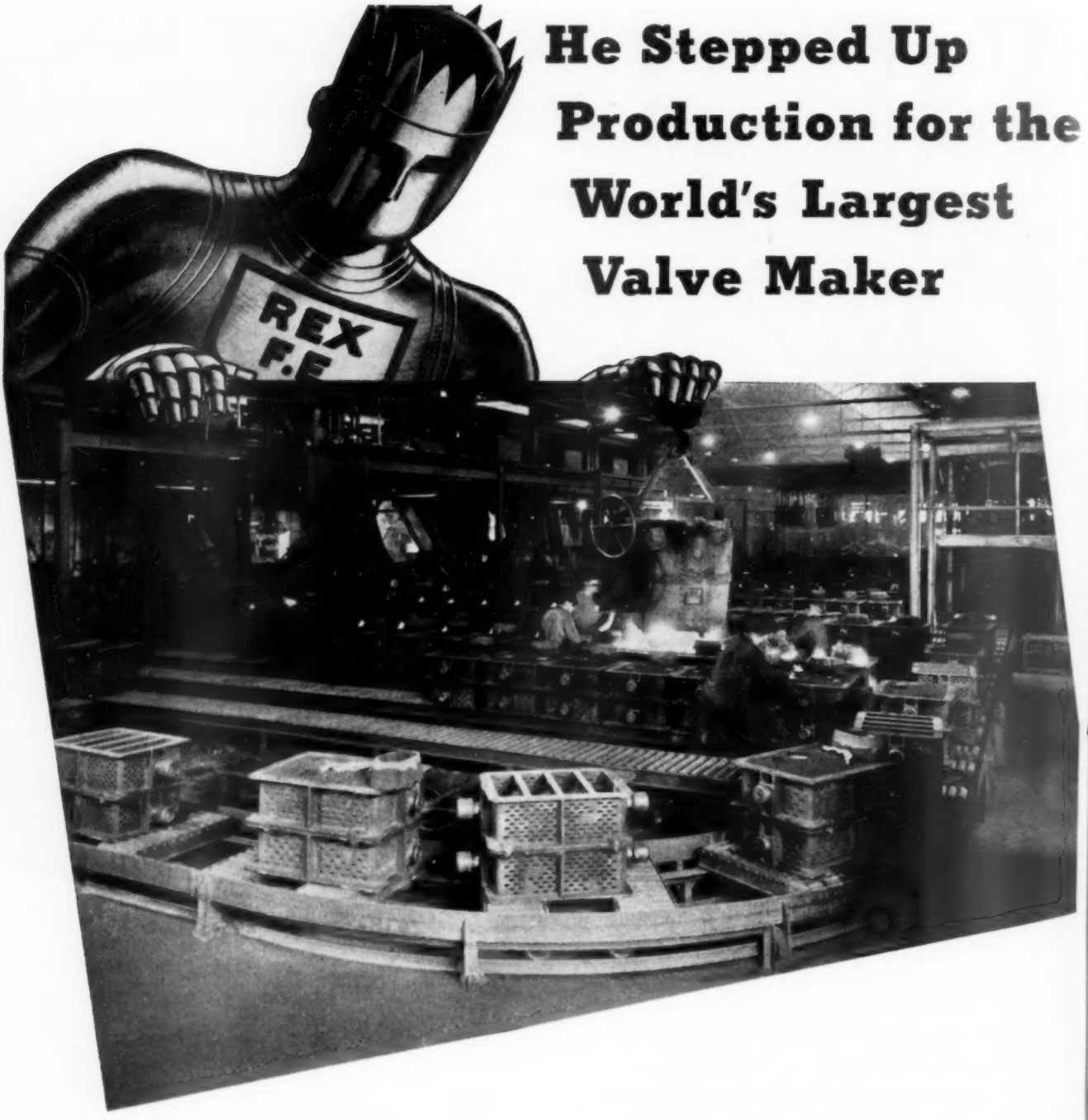
Top Industries Specify Buffalo Patterns

Many of the first automotive and aviation precision metal patterns have been developed by Buffalo Pattern Works. Today, "Buffalo's" leadership in precision pattern making is a known fact among top industries. Consult "Buffalo" on your most difficult and intricate pattern requirements.



BUFFALO PATTERN WORKS
830 Hertel Ave. Buffalo 16, N. Y.

He Stepped Up Production for the World's Largest Valve Maker



VALVES ARE VITAL to a nation at war, and to keep pace with the stepped-up wartime demand, valve production had to be greatly increased.

Called in to help increase the capacity of the world's largest maker of valves, Rex Foundry Engineering . . . Rex F. E. . . . knew that the best way to accomplish this would be to modernize the handling system. For, through his many years of experience in solving foundry problems, Rex F. E. knew that no other single factor is more directly responsible for operating efficiency than the right method of handling sand, molds and castings.

He and his staff of experienced foundry engineers designed a new, completely modern handling system. From the time the molding sand starts its journey to the foundry floor until the hot castings are shaken out, every operation is handled on an efficient Rex conveyor system that has greatly increased production capacity and at the same time released thousands of man-hours for other vital production.

* * *

Rex F. E. and his staff of foundry trained engineers are always at your service . . . to help you design and install the best system for your foundry. For complete information, write Chain Belt Company, 1671 West Bruce Street, Milwaukee 4, Wisconsin.

REX **FOUNDRY HANDLING SYSTEMS**

CHAIN BELT COMPANY OF MILWAUKEE

"know how"

IS VITAL TO A

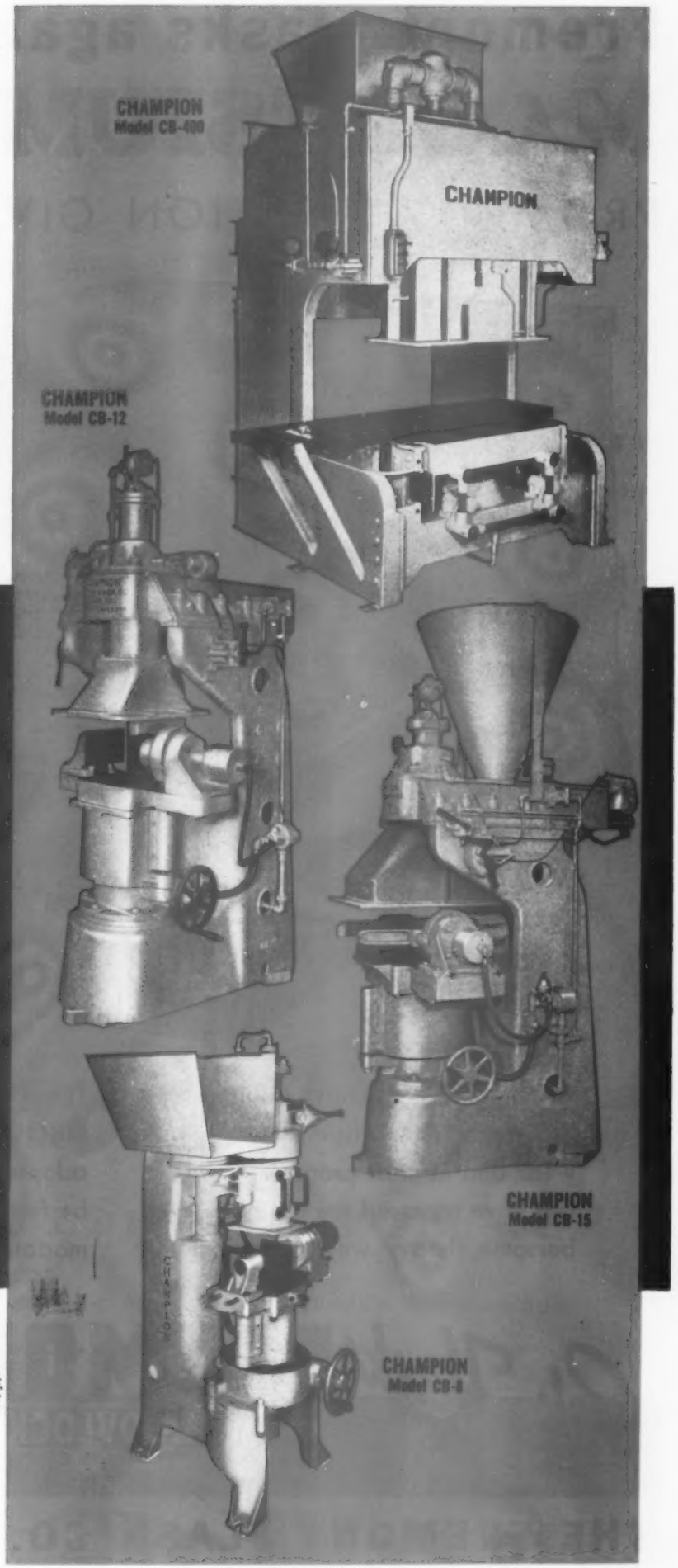
CHAMPION

Call it instinct, if you will; or "savvy," practical wisdom, comprehension, skill—a *Champion* in any field must have it to set him apart from the "also rans."

For 47 years *Champion* has been making foundry equipment and acquiring the "know how" to make better and better Core Blowers.

Every core rammed by a *Champion* is uniformly accurate whether produced by man, woman or child operator. A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamps in the proper cycle.

Champion Core Blowers have that extra "know how."



CHAMPION
FOUNDRY & MACHINE CO.
1918 W. 21st St., Chicago 8, Illinois

Fremont Flasks again available in MAGNESIUM METAL

PROMPT ATTENTION GIVEN ALL ORDERS

FREMONT FLASKS have established a reputation for efficiency and long wear and in most progressive foundries have replaced the old type, cumbersome, heavy weight equipment.

The FREMONT FLASK with the 1" GROOVLOCK PIN is especially adapted to snap work but can also be furnished with cast ears to accommodate other pins.

Slip Flasks **FREMONT** Jackets

GROOVLOCK

THE FREMONT FLASK CO...FREMONT, OHIO

Foundry

METAL CUTTING MACHINE

Keeping ahead of trends in the processing of magnesium and aluminum castings, DeWalt introduces this specially designed machine for removing gates and risers. Completely new in foundry methods, this DeWalt puts the cleaning room *on a production schedule* and increases the efficiency of the entire foundry. Write for descriptive literature.

DE WALT PRODUCTS CORPORATION

LANCASTER, PENNSYLVANIA

two strikes on you!

IF you're trying to produce the purest iron without the consistent use of Famous CORNELL Cupola Flux you've got "two strikes on you" before the game really begins.

If this statement arouses you somewhat we hope that you will challenge us to produce the facts on which it is based.

It is significant that foundrymen have purchased more and more Famous CORNELL Cupola Flux during each of the more than 25 years since it was first introduced, requiring repeated enlargement of our plant and the development of special high production machinery to keep up with the demand.

Foundrymen rate high among specialized industrialists in their efficient handling of practical matters. To earn their continued recognition products must have tangible merit.

If you are not using Famous CORNELL Cupola Flux you'll be surprised to learn, upon investigating, how many such advantages are available to you. Why not write today?

Let this trademark remind you of the most popular of all iron fluxes in the convenient and economical brick form.

The CLEVELAND FLUX *Co.*

Manufacturers of Iron, Brass and Aluminum Flux Since 1918

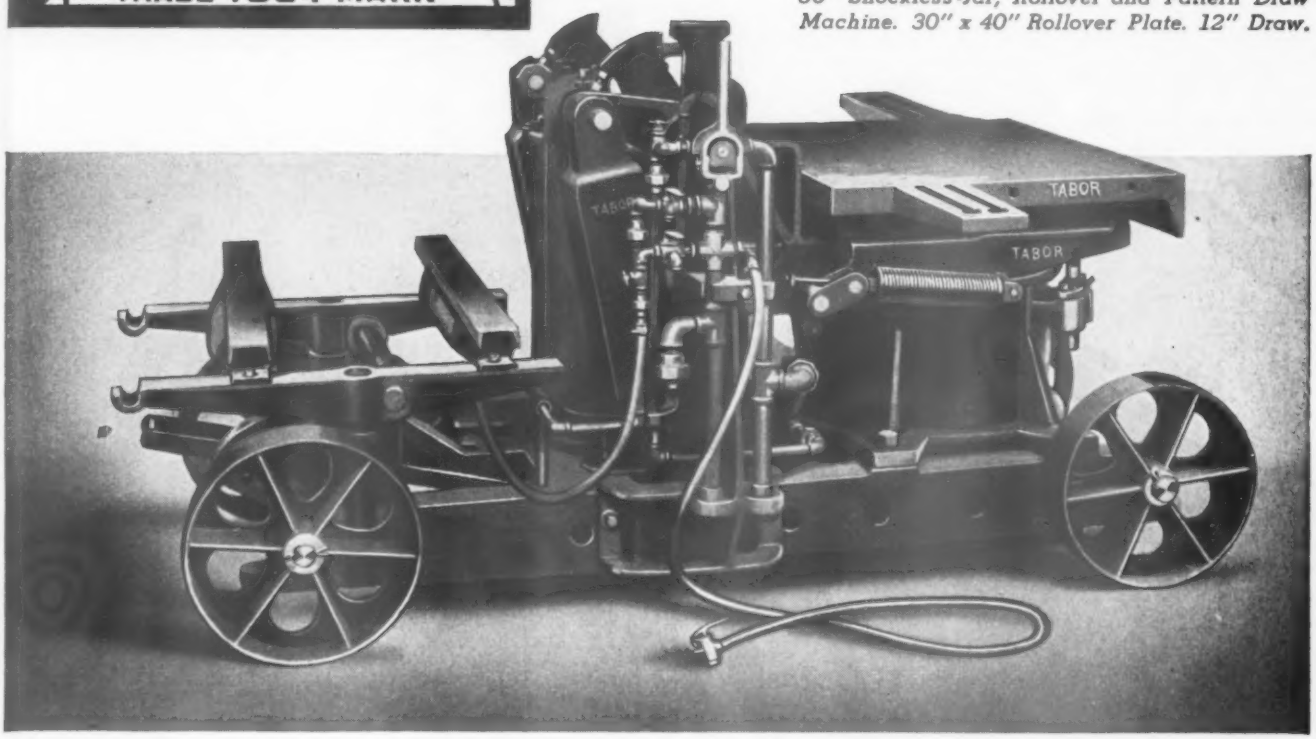
1026-36 Main Ave., N. W.

CLEVELAND, OHIO

TABOR

TRADE 1884 MARK

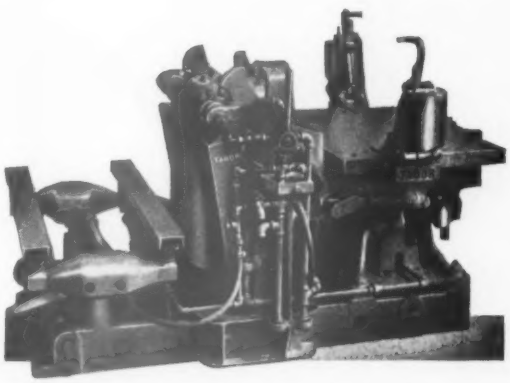
30" Shockless-Jar, Rollover and Pattern Draw Machine. 30" x 40" Rollover Plate. 12" Draw.



TABOR JAR, POWER ROLLOVER POWER PATTERN DRAW MACHINES

Tabor machines handle jobs up to their full rated capacity in a matter of seconds for a complete operating cycle. Ramming time is reduced to a minimum by the efficient Tabor jarring member . . . Rollover is oil controlled for maximum speed with absolute safety . . . Automatic leveling device eliminates possibility of shift . . . Draw is smooth at any desired speed by air-on-oil, and is accurate throughout the life of the machine.

Tabor Jar, Rollover Pattern Draw Machines are furnished in all practical sizes; plain-jar or shockless-jar; with or without air-operated flask clamps; stationary and portable types. Bulletin 424 illustrates and describes the complete line.



22" Plain-Jar, Rollover and Pattern Draw Machine. 22" x 42" Rollover Plate. 10" Draw. Equipped with air-operated Flask Clamps.

TABOR FOUNDRY MOLDING MACHINES:
FLASK LIFT MACHINES • SQUEEZERS AND JAR SQUEEZERS • JARRING MACHINES • ROLLOVER MACHINES • TABOR-BRASIVE CUT-OFF MACHINES

THE TABOR MANUFACTURING CO.
6225 Tacony Street
Philadelphia 35, Pennsylvania

HEADQ

RTERS FOR:

THE

GREAT LAKES LINE

MOLDING SANDS
BOND BLENDED SANDS
JUNIATA BANK SANDS
LAKE CORE SANDS
OTTAWA SILICA SANDS
DIAMOND BLAST SAND
FLINT SHOT BLAST SAND
GOLD JACKET BLAST SAND
GEM QUARTZ BLAST SAND
MUSCATINE BLAST SAND
STEEL SHOT & GRIT
BLASTING NOZZLES
BENTONITE (VOLCLAY)
REBONDING CLAYS
REFRACTO FIRE CLAYS
A. B. C. FOUNDRY COKE
FIRESTONE (Sawed & Rough)
MICA SCHIST—GRITS
GANISTER (FIREGAN)
LIMESTONE—DOLOMITE
FLUORSPAR
DE-SUL-FLUX
NEPHELINE SYENITE

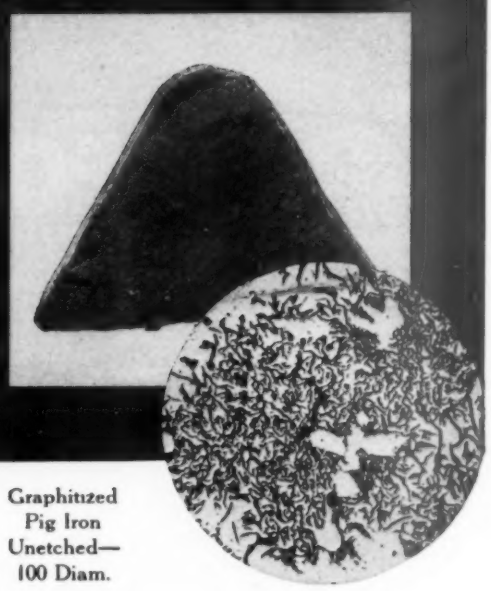
Great Lakes Foundry Sand Co.

UNITED ARTISTS BLDG.
DETROIT, MICH.

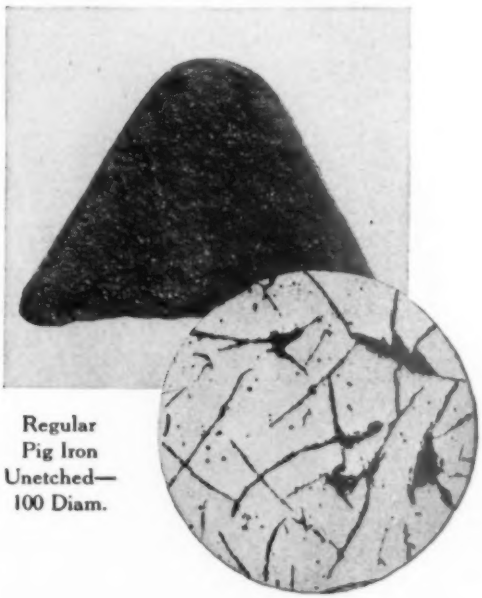
Members Of
American Foundrymen's Association
National Industrial Sand Association
American Ceramic Society
Foundry Equipment Manufacturers Association

An outstanding improvement in Pig Iron

G-IRON*



Graphitized Pig Iron Unetched— 100 Diam.



Regular Pig Iron Unetched— 100 Diam.

*GRAPHITIZED pig iron which imparts to gray iron castings an improvement in—

GRAIN REFINEMENT
MACHINEABILITY
FLUIDITY
SHRINKAGE

TONAWANDA IRON CORPORATION

NORTH TONAWANDA, N. Y.

Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

* *Covered by U. S. and Canadian Patents*

Marabond

For Cores... LARGE AND SMALL

Both photographs show Marabond production cores in a prominent Middle Western Steel Foundry.

CORES MADE WITH *Marabond* SHOW THE FOLLOWING ADVANTAGES:

SMOOTHER CASTINGS—Decreased Cleaning Room time and labor.
EXCELLENT COLLAPSIBILITY—No Hot Tears and easy Shakeout.
NO ACRID OR NAUSEATING GAS—In Core Room or on the Foundry Floor.
FASTER BAKING—Both Time and Temperature may be reduced.
REDUCED COSTS—Total Cost of all ingredients materially reduced.

FOR CONDITIONING HOT RECLAIMED SAND for backing mixes, *Marabond* is likewise extremely valuable. Ordinarily such hot sands promptly lose their tempering water and become so stiff as to be unworkable when the molder attempts to use them. By adding ¾%-1% of *Marabond* to this mix and tempering to 6-7% moisture, such hot black sand will automatically level out and remain at a moisture content of 3%-3½% for an extended period. This results in a constantly workable backing sand without extensive retempering on the foundry floor.

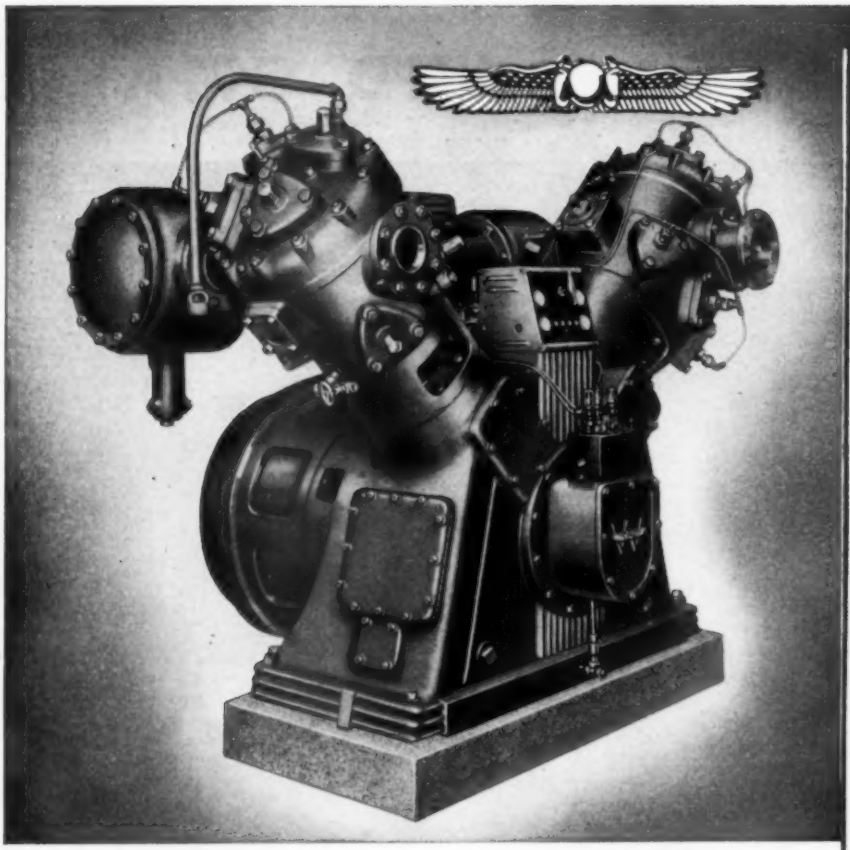
Marabond is an organic binder which creates reducing conditions in the mold at the elevated temperatures existing during pouring!

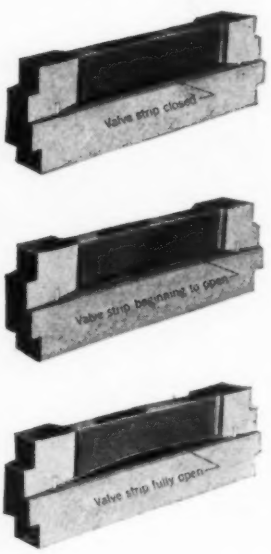
WRITE FOR ADDITIONAL INFORMATION OR SAMPLE

Produced by the Makers of LIGNOLITE PATTERN PLATES

MARATHON CHEMICAL COMPANY
DIVISION OF MARATHON PAPER MILLS COMPANY
ROTHSCHILD WISCONSIN

NEW WORTHINGTON HUSKIE PACKAGED COMPRESSORS





The simplest, lightest, most efficient compressor valve ever made. A thin strip of steel seats by increasing contact from each end to the center. No springs, buffer plates or cushioning devices. Fits accurately even when valve seat is warped, and patented end inserts prevent pinching.

For Cooler Running . . . Trouble-Free Operation

Here's a lot of long-lived power, from 400 to 1350 cu. ft. per minute displacement, in a new streamlined "package" specially designed for trouble-free operation, low installation and maintenance costs.

In both 3 and 5-step models, variable capacity control results in the *cooler operation* of Worthington's new Y Angle Type Huskie Compressors. Cylinders are open to cool suction air at most stages of unloading.

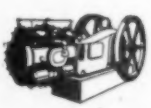
Other Worthington "Outperformance" features include Feather Valves*— forced feed lubrication — filters for uninterrupted oil filtration, non-stop filter-cleaning. Write for more details. Describe your application.

WORTHINGTON PUMP AND MACHINERY CORPORATION
HARRISON, N. J.

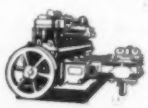
WORTH BEHIND THE NAME
WORTHINGTON

NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON HUSKIE

Y Type . . . Horizontal . . . Vertical . . . Radial



Portable . . . Gas Engine Compressors . . . Vacuum Pumps



*Reg. U. S. Pat. Off.

AC4-4

Here's A Fast Worker!

For Handling Foundry Yard Material

The easy-to-handle Link-Belt Speeder provides the necessary fast-moving handling of material around foundry yards and stock piles. Speed of operation is essential to real efficiency and speed is the Link-Belt SPEEDer's middle name!

9551

LINK-BELT SPEEDER

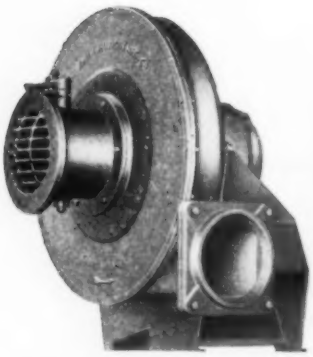
Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO 9, ILL.
(A DIVISION OF LINK-BELT COMPANY)

Simplicity...

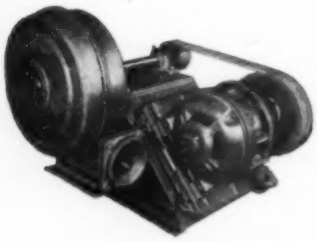
is the KEY NOTE in NORTH AMERICAN

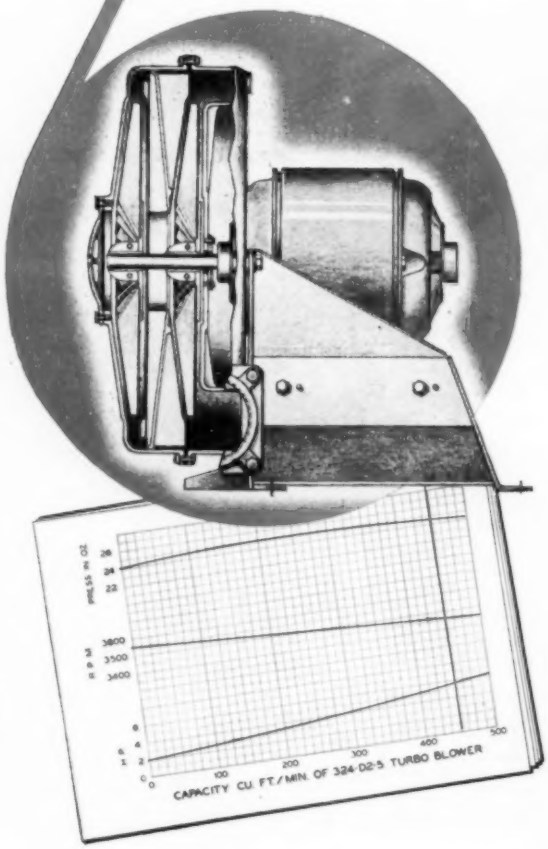
TURBO BLOWERS



(ABOVE) DIRECTLY CONNECTED. Butterfly valve on intake is standard equipment on larger sizes only. Smaller sizes equipped with intake guard—see section at right.

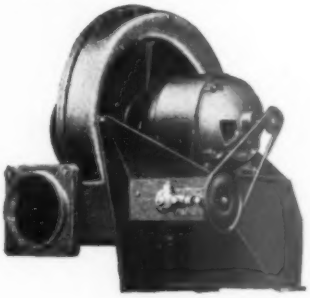
(BELOW) V-BELT DRIVEN. Used where 60 cycle A. C. current is not available.





(ABOVE) DIRECTLY COUPLED facilitates motor change. Blowers available in single or multiple stage—pressures from 8 to 32 oz. and volumes from 60 to 4300 cfm.

(BELOW) OIL PUMP ATTACHMENT for plants requiring small oil systems.



"NORTH AMERICAN for COMBUSTION"

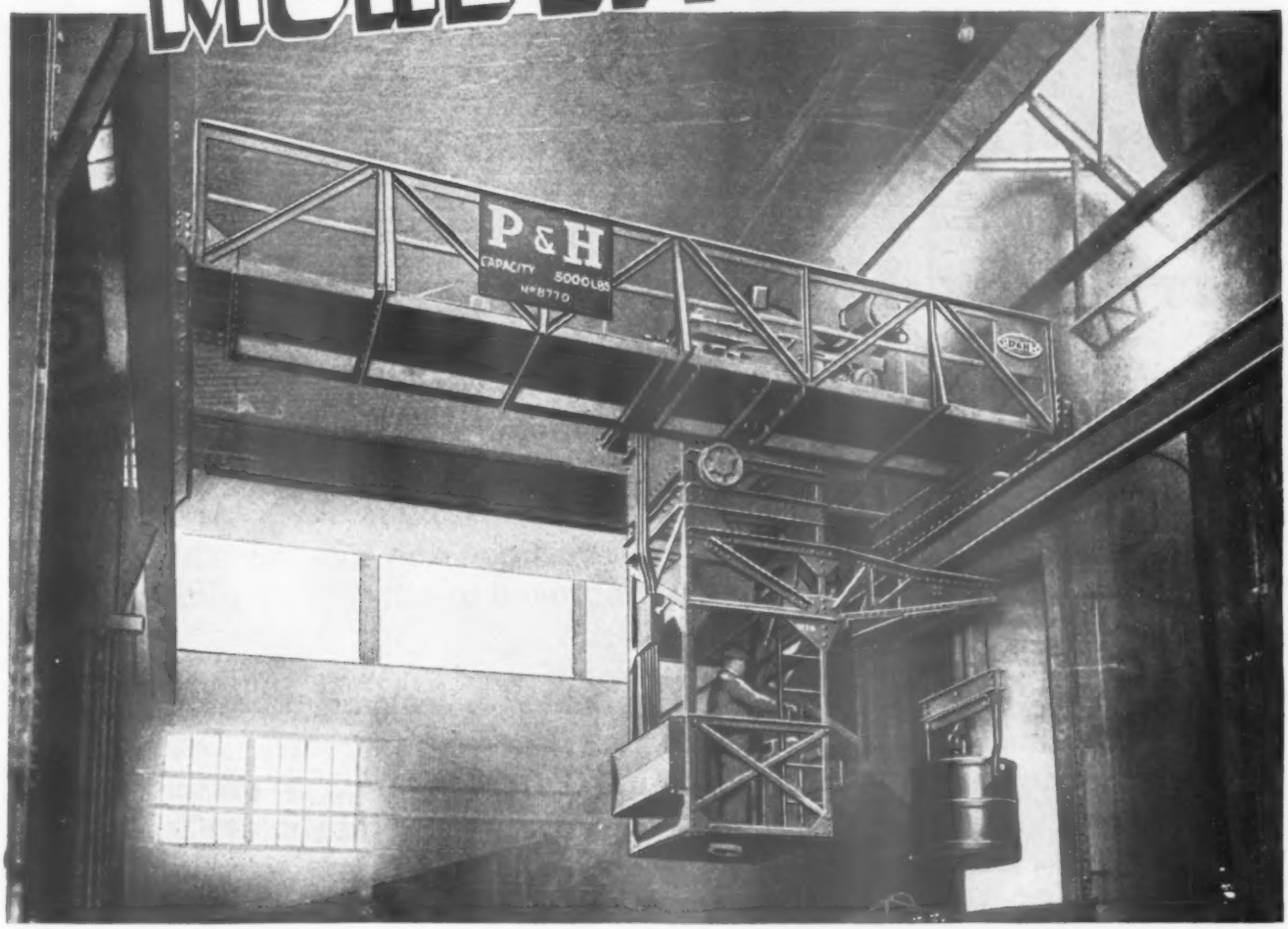
THE NORTH AMERICAN MANUFACTURING COMPANY

MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL

BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES

CLEVELAND, OHIO

MORE EFFICIENT..★★



P&H "Controlled Discharge" Cranes
FOR CUPOLA CHARGING

Here's the better charging method that provides complete control! With P&H's "Controlled Discharge" — your cupolas are charged at any level to give you even distribution of charges — to assure better melting control — to eliminate costly cupola damage.

What's more, P&H "Controlled Discharge" Cupola Charging Cranes and Hoists save manpower and charging time. They can be equipped with either drop-bottom or cone-type buckets. The method is flexible, allowing installation of cupola charging equipment to fit your requirements.

Don't put off the economies P&H "Controlled Discharge" Cranes and Hoists can give you. Be ready for fast, low-cost production tomorrow with a modern charging system that will pay for itself today. Call in a P&H Crane Engineer, or write us.

General Offices:

4405 West National Ave., Milwaukee 14, Wisconsin

HARNISCHFEGER
CORPORATION
ELECTRIC CRANES · EXCAVATORS · ARC WELDERS P&H HOISTS · WELDING ELECTRODES · MOTORS

PARASPRAY *Announces*

ITS POSSIBLE AVAILABILITY TO YOU

. . . if you are making vital aluminum, magnesium or other critical castings. Solution of production problems in making important castings by the use of PARASPRAY is a prime requisite. Advise nature of your castings and troubles which prevent increased output and improved quality. We'll gladly advise PARASPRAY possibilities.

PARASPRAY use has been permitted in casting aluminum airplane engine cylinder heads for over two years. These castings are vital and PARASPRAY has "stepped up production and quality spectacularly." Porosity and gas holes eliminated by PARASPRAY have cut scrap losses and rejections from 20 to 30%.

Cylinder head castings are intricate as well as important. So are numerous other castings. Yours may be more vital. PARASPRAY can prove equally or more valuable in many other fields. Write in detail so we can intelligently advise you.

(Also ask for your free test sample of PARA-COAT, the ideal pattern coating which has "proved the best in foundry tests.")

PARASPRAY CORES MOLDS

PARASET CORE BINDER

PARACOAT FOR PATTERNS

Sole licensees under the Saeger Patents exclusively regulating the use of rubber compounds in making and spraying cores and molds.

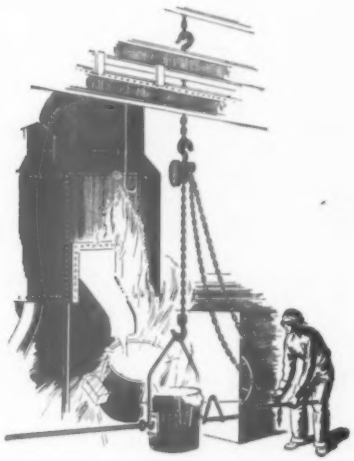
FOUNDRY RUBBER COMPOUNDS CORP.

1050 - 30th St., N. W. Washington 7, D. C. REpublic 2256

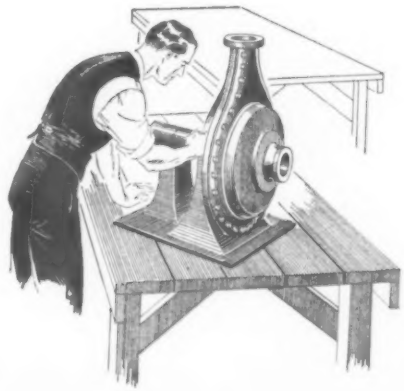
COPY'T 1943—FRCC

Practical Men to Give Practical Help Where Alloy Irons are Made and Used

Electromet field men, because of their broad founary experience, are frequently asked to help solve difficult foundry problems. They are located in every large foundry center. They talk the foundryman's language and understand his problems.



These field metallurgists can advise on the selection and best use of the sizes and grades of ferro-alloys available. They are familiar with a wide group of alloys; they do not have one "stock" answer for all problems. And their experience is backed by an extensive research program in the development of better alloy irons.



Electromet metallurgical engineers are prepared to help solve specific problems in the selection, fabrication, or use of alloy irons. If you need help in making the kinds of iron your customers want, call on Electromet. Further information about this service and brief descriptions of Electromet ferro-alloys and alloying metals are found in the booklet, ELECTROMET PRODUCTS AND SERVICE. Write for your copy.

BUY UNITED STATES WAR BONDS AND STAMPS

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

Electromet
Trade Mark
Ferro-Alloys & Metals

SPEED UP CORE PRODUCTION—Get Stronger Cores, Firm Edges, Reduce Baking Time, Breakage and Cleaning Costs

There is a Grade of

PEERLESS CORE OIL

TO MEET YOUR REQUIREMENTS!

Fast, efficient, foundry production begins in the core room. The more good cores produced, the more good castings can be poured.

PEERLESS CORE OILS are the perfected and proven products of our Industrial Division. They are available in a complete series. These various grades include the exact formula required for every situation.

If you are not already using PEERLESS CORE OILS, it will pay you to test them now, on your most difficult job and compare results for strength, detail, smooth working, breakage, baking time, cleaning costs, and general satisfaction.

Write us fully, and we will arrange to conduct tests in your foundry.

Peerless Core Oils Make Good Cores
Good Cores Make Good Castings
Good Castings Sell at a Profit

APEX INDUSTRIAL OILS AND CHEMICAL COMPOUNDS

APEX MOTOR FUEL COMPANY • INDUSTRIAL DIVISION
GENERAL OFFICES AND WORKS • 1401 W. NORTH AVE. • CHICAGO, ILL. • Phone ARMITAGE 7720

The "SLEUTH" with a "ONE TRACK" mind

Here's a foundry detective who wants to go to work for you.

He's a skilled metallurgist. He knows about irons, their melting and pouring characteristics, grain size and their many other technical details which affect casting quality.

And he's a practical foundryman who has spent years in foundries of every size and type.

When there are foundry troubles—when molten iron misbehaves or the percentage of imperfect castings rises—he knows where to find the "clues" that clear up such cost-increasing difficulties.

But most of the time his inquisitive mind follows a single purpose—a "one-track" course—constantly searching for ways and means to increase your output, improve your product and cut your costs.

Get to know this man—the Republic Pig Iron Metallurgist. He can be of inestimable assistance to you just as he has been to other foundry executives. And he'll be always at your elbow whenever you need him. Tell us when to send him.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York 17, N.Y.

Republic PIG IRON

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS

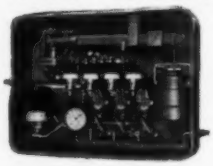
THE PUDDING THAT'S BEEN PROVED

WHY has this Gardner-Denver "HA" Two-Stage Horizontal Compressor gained a nation-wide reputation for dependable service?

Because in hundreds of plants, it has for years delivered a continuous volume of air, even under the demands of three-shift operation. Because maintenance requirements are remarkably low. Because it is putting *greater production power* behind machinery and air tools.

And because it is engineered for heavy-duty service with frame, cylinders and pistons cast in GarDurloy—the stronger, tougher cast iron developed by Gardner-Denver metallurgists.

CHECK THESE PROVED FEATURES



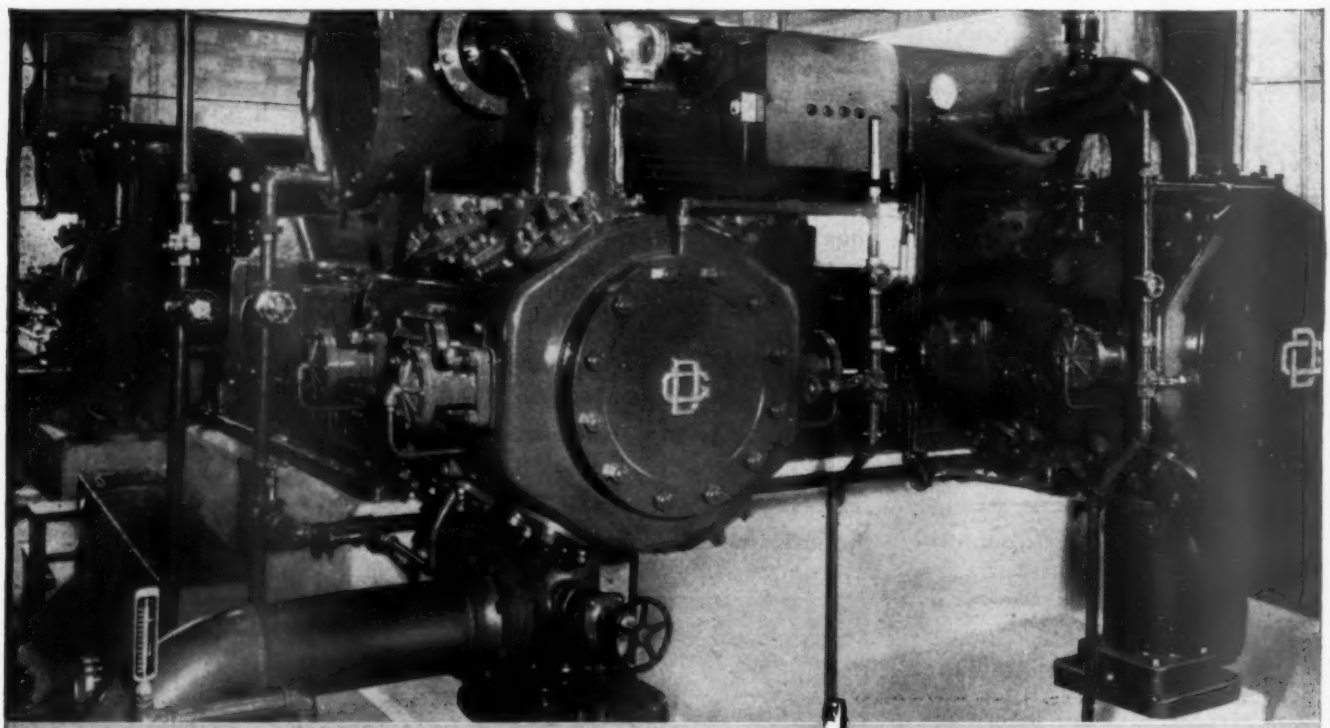
1 Class M-25CS recycling 5-Step capacity control system, accomplished by simple magnetic mercury control governor. No complicated lever and spring arrangements.

2 Unrestricted air passages and large valve areas.

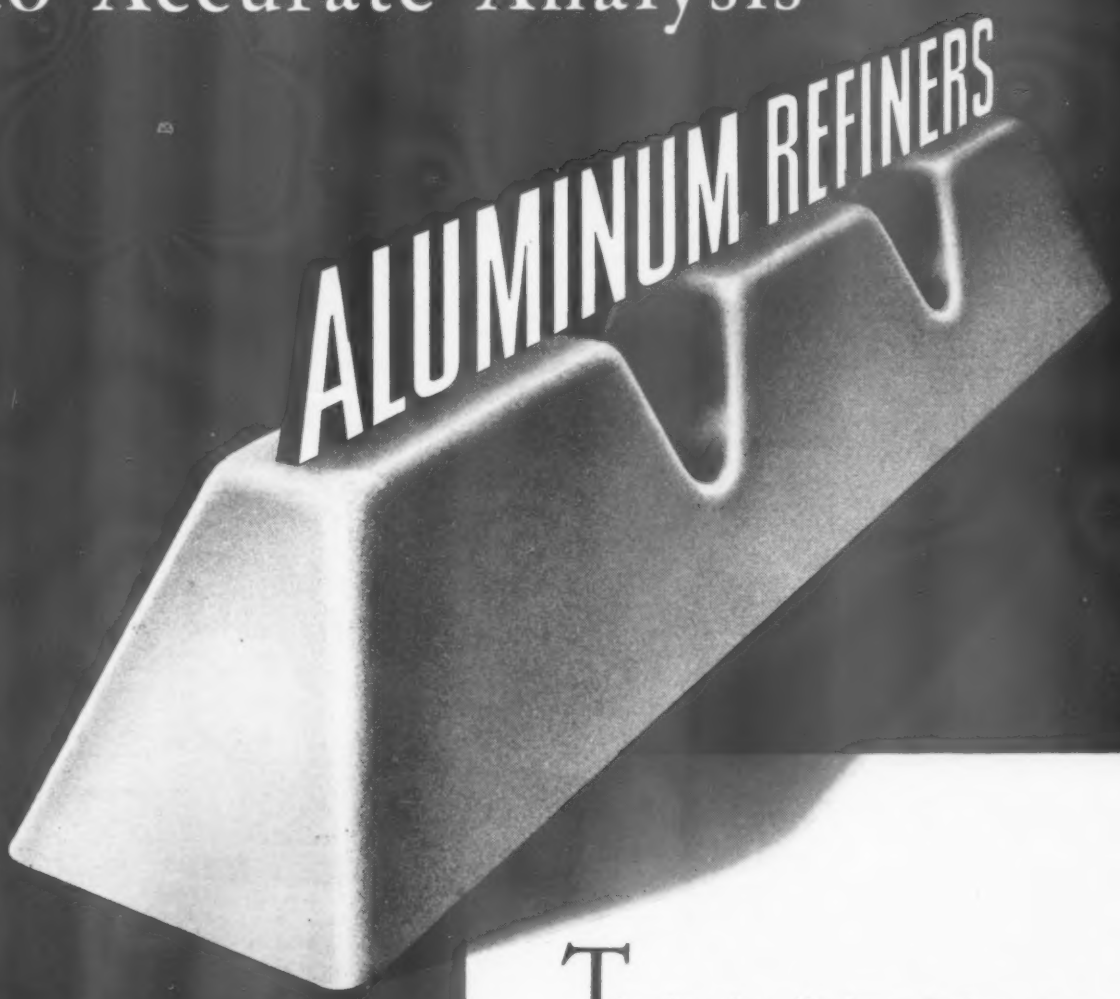
3 Timken main bearings for smooth, economical operation.

4 Large water jacket areas for cooler running compressors.

For complete information and specifications on "HA" Compressors, write Gardner-Denver Company, Quincy, Illinois.



Quantity Production to Accurate Analysis



The fact that Aluminum Refiners is a quantity producer of Aluminum Alloy Ingot means also that we are a quality producer. For our volume is such that we are enabled to use the finest and newest equipment—install the most elaborate production and laboratory checks and tests. Consider Aluminum Refiners as your source of supply for Aluminum Alloy Ingot—combining both quality and quantity production.

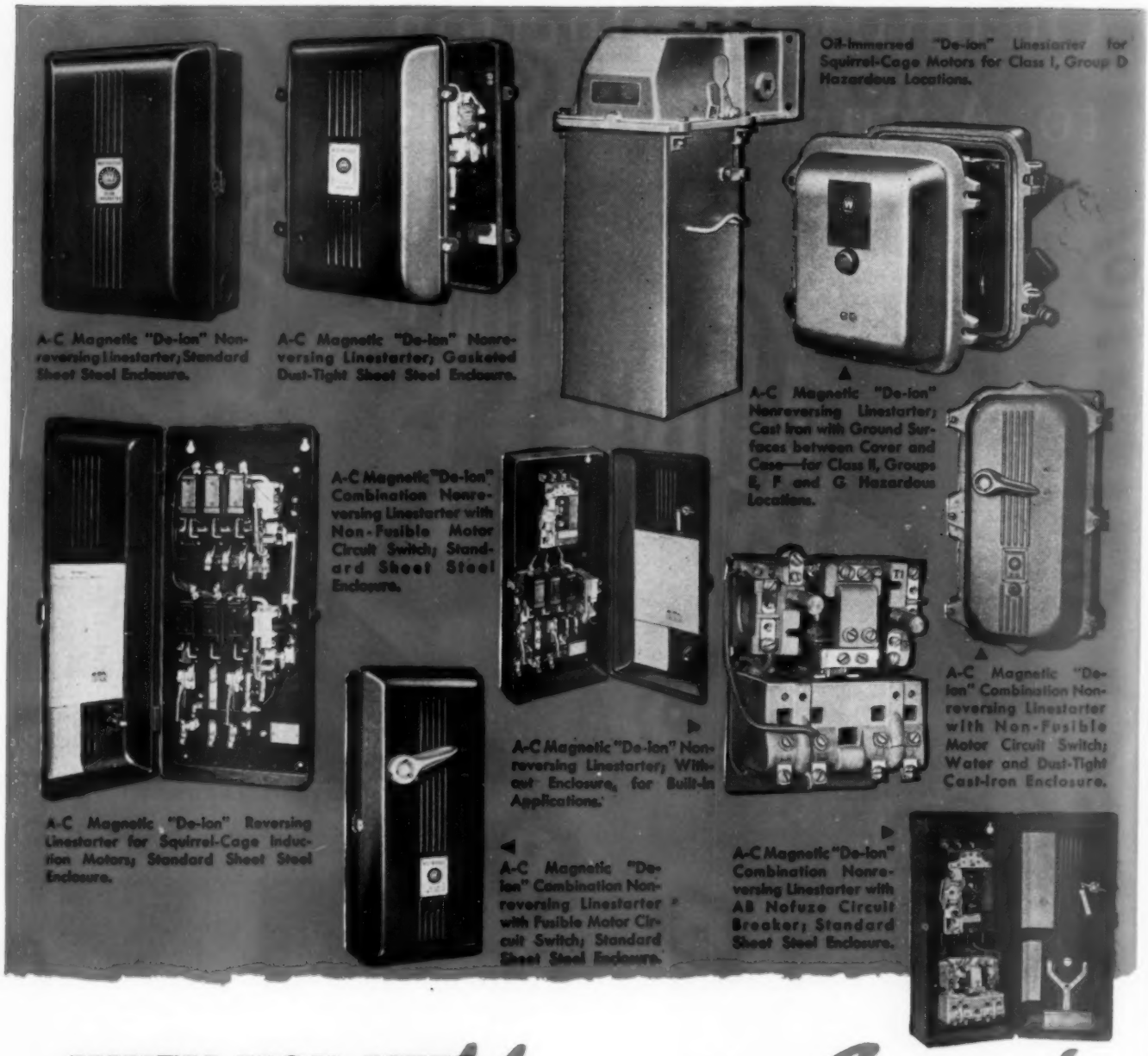
ALUMINUM REFINERS

Division of

BOHN ALUMINUM & BRASS CORPORATION • Detroit 26, Michigan

General Offices Lafayette Building

MANUFACTURERS OF ALL TYPES AND SHAPES OF CASTING AND DEOXIDIZING ALLOYS


A-C Magnetic "De-ion" Nonreversing Linestarter; Standard Sheet Steel Enclosure.
A-C Magnetic "De-ion" Nonreversing Linestarter; Gasketed Dust-Tight Sheet Steel Enclosure.
Oil-Immersed "De-ion" Linestarter for Squirrel-Cage Motors for Class I, Group D Hazardous Locations.
A-C Magnetic "De-ion" Nonreversing Linestarter; Cast Iron with Ground Surfaces between Cover and Case—for Class II, Groups E, F and G Hazardous Locations.
A-C Magnetic "De-ion" Combination Nonreversing Linestarter with Non-Fusible Motor Circuit Switch; Standard Sheet Steel Enclosure.
A-C Magnetic "De-ion" Nonreversing Linestarter; Without Enclosure, for Built-in Applications.
A-C Magnetic "De-ion" Combination Nonreversing Linestarter with Non-Fusible Motor Circuit Switch; Water and Dust-Tight Cast-Iron Enclosure.
A-C Magnetic "De-ion" Reversing Linestarter for Squirrel-Cage Induction Motors; Standard Sheet Steel Enclosure.
A-C Magnetic "De-ion" Combination Nonreversing Linestarter with Fusible Motor Circuit Switch; Standard Sheet Steel Enclosure.
A-C Magnetic "De-ion" Combination Nonreversing Linestarter with AB Nofuze Circuit Breaker; Standard Sheet Steel Enclosure.

WHEN YOU NEED *Magnetic Controls*

FOR SINGLE-PHASE AND SQUIRREL-CAGE MOTORS CONSULT WESTINGHOUSE BUYING DATA (NEW CATALOG 7000)

With the new Westinghouse Buying Data, you can select and purchase the proper motor control in half the time.

Data, as presented, is striking in its newness. It's easier to read, easier to understand, and easier to use than any published previously by any manufacturer.

Chances are—if you are a buyer of motors and controls—that you have already received a copy of this new Catalog 7000 by mail. However, if you have not received your copy, write, wire or phone your nearest Westinghouse district office. (Requests will be filled through district offices only — no mailing from Westinghouse headquarters at East Pittsburgh.) J-60552

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

De-ion Linestarters

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USED IN GOOD FOUNDRY PRACTICE FOR 34 YEARS

CORE BINDER

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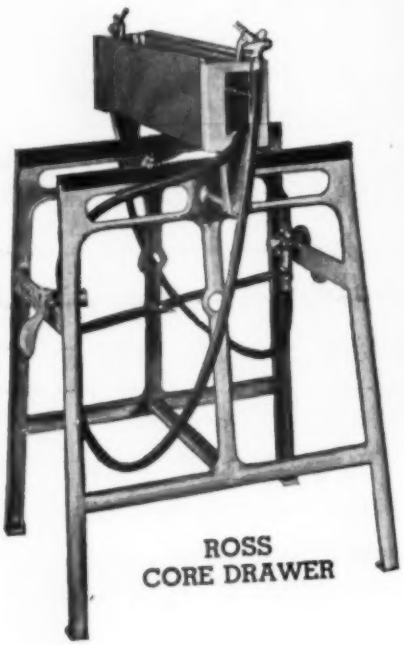
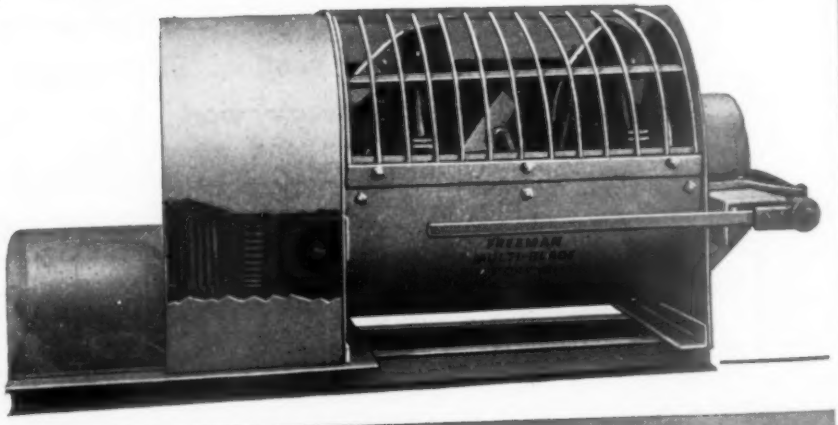


ROSS
CORE DRAWER

FREEMAN MULTI-BLADE
FOUNDRY MIXER



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Industry Benefits as More Foundrymen Review Progress, Plan for Future

PAPERS and discussions at the recent Buffalo congress and annual convention of the American Foundrymen's Association show the foundry industry has made considerable technical progress while meeting tremendous demands for war castings. Undoubtedly the *know how* accumulated through years of experience in the production of castings, plus these newer developments in both practice and product, should aid foundrymen in making the castings to finish the war, and then provide a firm foundation on which to build for postwar competition.

The annual meeting, which this year included the War Production Foundry Congress and a large exhibition of foundry equipment and supplies, was marked with success in spite of major difficulties in transportation and hotel facilities. A new record of registered attendance was set at Buffalo, and the total obviously would have been higher if the scarcity of room accommodations had not developed. The technical program was extensive and well attended, papers were of a high caliber, and the exhibition, one of the largest in history from the standpoint of number of exhibitors, received praise from foundrymen and exhibitors alike. Although some equipment was purchased at the show and indications were apparent that a certain amount of buying would be done in the near future, the majority of foundrymen seemed to be studying application of available equipment to postwar modernization and, in a few cases, expansion.

Several rather interesting trends may be discerned from the 1944 meeting. While the record attendance may have resulted from the general inclination of people to attend conventions or to get away from the job for a few days, it would seem that the basic reason may be more fundamental. With the growth of the A.F.A. chapter movement, and the increased interest in chapter programs, hundreds of foundrymen are meeting every month to discuss foundry problems. Quite naturally, this interest becomes translated into a desire to attend the annual meeting of the parent organization and to participate in the activitites of the main show. Therefore, the number of new faces at conventions continues to increase.

General discussion at some of the formal technical sessions at Buffalo was rather brief, due perhaps in part to the large number of papers listed for presentation. Over a period of years shop operation courses and roundtable discussions at annual meetings have proved exceptionally valuable as the forum for the exchange of ideas on the theory and practice of founding. More recently a number of chapters have been most successful in staging group or panel type meetings where simultaneous sessions are devoted chiefly to discussions from the floor. Experience in these directions may point the way to technical sessions with fewer papers and more time and effort devoted to a general interchange of information.

For Meritorious Service

AFTER nearly three years of service to the war effort, William Kerber has resigned as deputy assistant director of the Steel Division, War Production Board, and has rejoined the Hanna Furnace Corp. at Buffalo. Bill went to Washington in 1941 as chief of the Pig Iron Unit, Raw Materials Section, Office of Production Management.

At that time the pig iron situation was in a state of confusion. Although individual pig iron producers were attempting rationing of available pig iron to foundries, changes in production emphasis and diversion of iron to steelworks use had resulted in an inequitable distribution, and in the threat of curtailed operations in some foundries. To add to the confusion, an allocation order had been signed and the date set for the filing of the first reports by foundries, but copies of the report blanks, properly addressed to ferrous foundries, rested in a corner of the OPM mailing room as the day for filing approached.

Bill Kerber landed in Washington in the middle of this mess. He gathered a few intelligent assistants and plunged into the job of making the first allocation. Only those in Washington at the time can appreciate the tremendous effort put forth by that small group to make the first and subsequent allocations. But the job was accomplished, not a single foundry had to shut down for want of iron, and the industry realized that everyone had been fairly treated. By developing and operating the allocation system, the Pig Iron Unit made it possible for ferrous foundries to produce war castings at maximum capacity.

Bill Kerber and his associates surely deserve citations for this outstanding contribution to the war effort and the foundry industry.

Frank G. Steinebach
Editor

Record Attendance Marks Successful A.F.A.

Left—Group at Canadian members' luncheon. Back row (left to right) Joseph Sully, Sully Brass Foundry Ltd., Toronto; E. N. Delahunt, Warden King Ltd., Montreal; Harold J. Roast, Canadian Bronze Co Ltd., Montreal; C. C. McDonald, Frederic B. Stevens of Canada, Toronto. Front row (left to right) Robert E. Kennedy, A.F.A. secretary; Ralph J. Teetor, new A.F.A. president; Lee C. Wilson; retiring A.F.A. president

Above—Speakers' platform at annual business and awards meetings. Left—Apprentice Training Committee luncheon. Below—Registration desk was crowded throughout the week as attendance broke all records. Right below—Dinner meeting of A.F.A. chapter officers

CONGRESS

New A.F.A. officers. Right — President, Ralph J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich. Below—Vice president, Fred J. Walls, International Nickel Co. Inc., Detroit

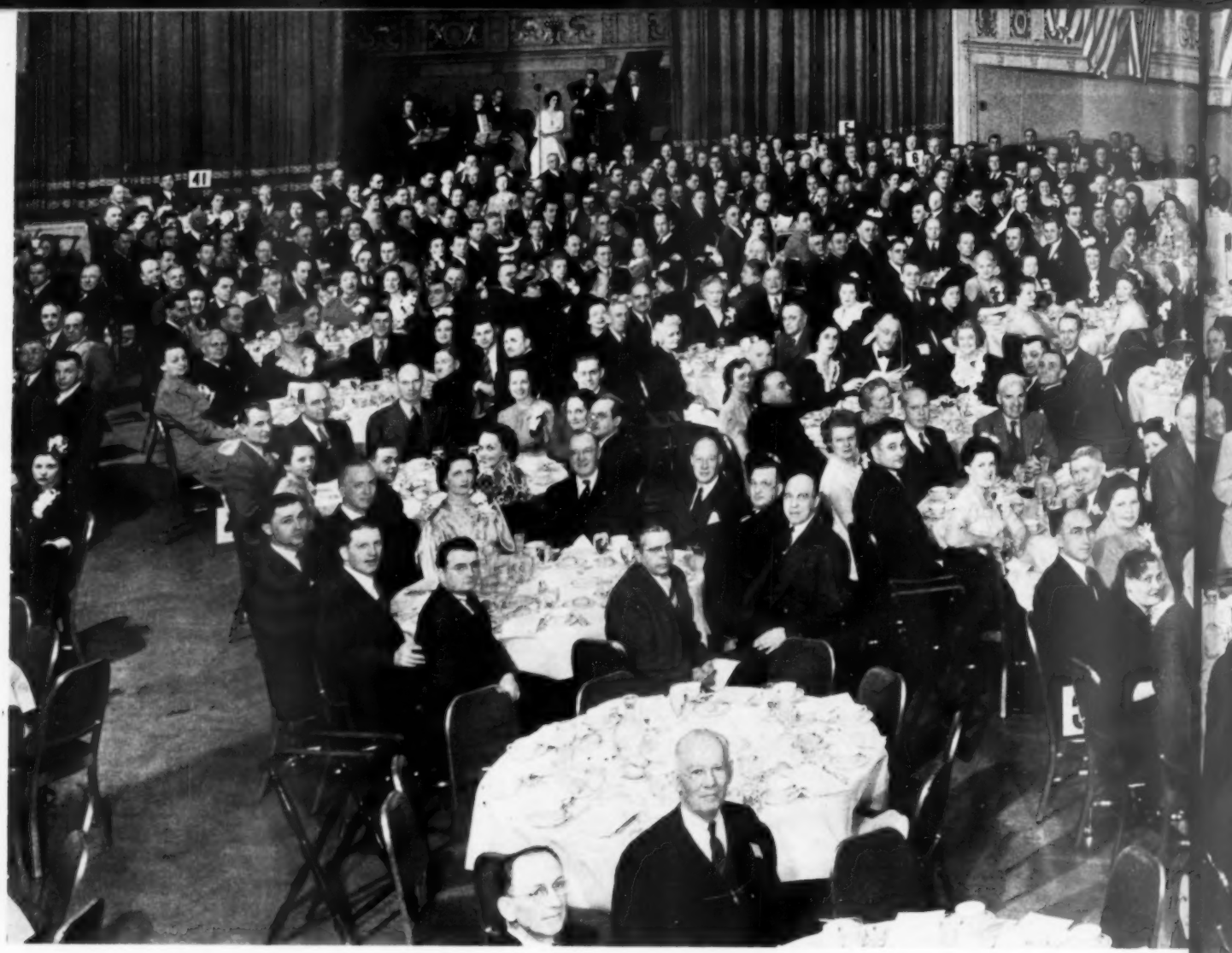
THE forty-eighth annual convention of the American Foundrymen's Association, held in Buffalo, April 25 to 28, attracted the largest attendance in the history of that organization. Almost 7000 from the foundry and allied industries registered for the Convention, the War Production Foundry Congress, and the Exhibition of equipment and supplies, which were staged simultaneously. In addition, slightly over 4000 foundrymen of the Buffalo area attended the Exhibit Preview on Monday night under the auspices of the Western New York Chapter of the A.F.A.

In welcoming delegates attending the opening session of the congress Tuesday morning, Lee C. Wilson, A.F.A. president, emphasized that the keynote of the four-day meeting was the production of superior weapons which would aid in shortening the war. A brief address of welcome also was given by Frank E. Bates, Worthington Pump & Machinery Corp., and chairman of the Western New York Chapter of the A.F.A.

Importance of the foundry industry to the war effort was cited by Rear Admiral A. H. Van Keuren, director Naval Research Laboratory, Washington, in tracing the activities of that organization in the field of castings research for naval purposes. The laboratory's program has been carried out for more than 15 years, originally having been started to study steel castings but subsequently enlarged to embrace other metals as well. The fact that a destroyer requires approximately 9000 valves and fittings and a battleship some 15,000 castings exclusive of structural members, makes the Navy's concern over the soundness of the castings it uses a natural one, Admiral Van Keuren pointed out. Further, the high cost of repairing ship parts damaged by casting failure warrants a certain amount of expense to assure soundness of castings before they are installed.

Metallurgy always will be an important part of naval research, the speaker stated, adding the prediction that the trend toward use of combination cast and welded structures likely will continue. In closing he urged the foundry industry to take full advantage of the results of various programs of private and joint research activities.

The foundry industry is faced with a difficult task in attempting to maintain production in the face of the shrinking manpower supply, it was stated by H. S.



Colby, consultant to the Deputy Vice Chairman for Production, War Production Board, Washington. Addressing the first war production manpower session of the congress he traced the history of attempts by WPB and other government agencies to relieve the manpower problems which foundries have faced for many months —problems which have become intensified lately by the heavier inroads of Selective Service into the ranks of younger workers.

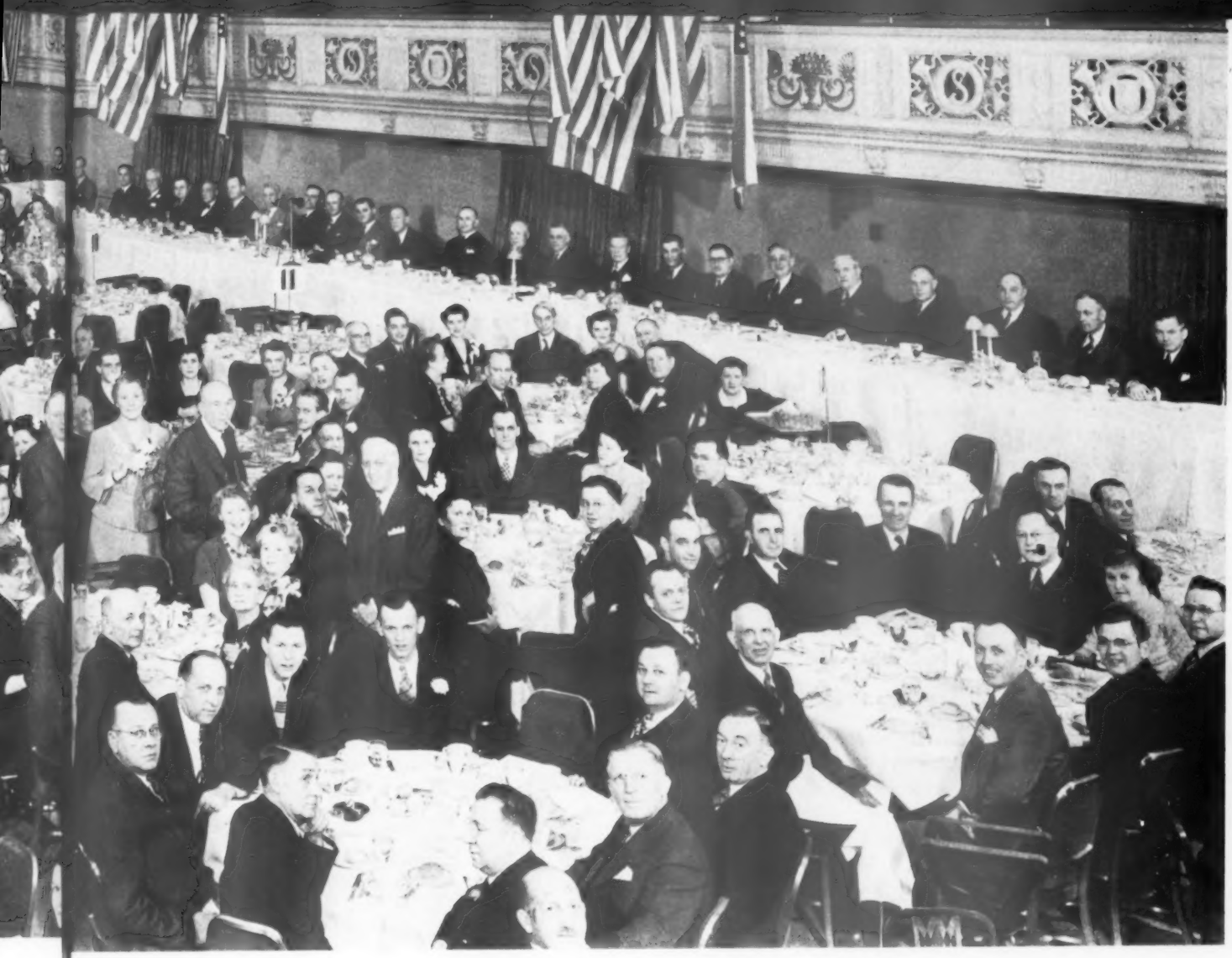
While foundries originally were not given sufficient recognition in the essentiality of workers of certain skills, this situation subsequently was corrected. Wage adjustments, in some cases accompanied by revisions in casting prices, also proved helpful. However, the recent move by Selective Service to limit deferments among workers under 30 years old appears likely to impose a severe handicap. Foundry workers under 26 years old represent slightly less than 5 per cent of the total, but extension of the more thorough draft to the 26 to 30-year group will affect 15 per cent or more of all workers and probably will cause a critical situation from the production standpoint.

Output of foundries has increased 15 per cent since last September while the number of workers has increased only 2 per cent, but Mr. Colby expressed doubt that the industry could maintain this improved production if faced with the loss of 15 per cent of its employes. He indicated that WPB is vitally concerned with seeking some solution to the problem which will not result in a shrinkage in war production.

Postwar progress of the individual foundry will be influenced to an important extent by the attention it devotes to apprentice training, it was stated by Clem J. Freund, dean of engineering, University of Detroit, in opening the second war production manpower session Wednesday morning. Principal address at this meeting was by William F. Patterson, director, Apprentice Training Service, War Manpower Commission, Washington, who spoke on "Postwar Apprenticeship Problems."

Mr. Patterson pointed out that while there is an urgent need for maintaining training programs today to obtain workers needed in current war production, it is important that foundries also lay plans now for postwar training. Despite the handicaps imposed by the war, interest in apprentice training is well maintained. Last year about 50 per cent of the new apprentices were obtained from the group of 16 to 17 year old boys who combined high school courses with foundry work; 25 per cent came from 4-F's; 12 per cent consisted of older workmen; 8 per cent were women, and the balance were from miscellaneous classifications.

Returned veterans will be an increasingly large source of prospective apprentices, and Mr. Patterson urged foundries to make a definite attempt to secure such



Annual dinner of the A.F.A., concluding the War Production Foundry Congress, filled the Hotel Statler ballroom to capacity

workers. With an industry total of nearly 90,000 skilled foundrymen, it would be desirable to have more than 10,000 apprentices constantly in training and an annual addition to the ranks of about 3700. The fact that discharged servicemen have experienced well-organized training for military service makes it important that industry provide programs for training workers which will compare favorably from the standpoint of effectiveness and efficiency.

There is also a need for better publicity in connection with foundry apprentice training programs. Mr. Patterson cited instances in which numerous applications were received from prospective apprentices after foundries had publicized their programs in their immediate localities. Praising the activities of the American Foundrymen's Association in promoting apprentice training, Mr. Patterson stated that his service was anxious to assist foundries in this work and that the Apprentice Training Service now has 180 field men available for consultation.

James G. Goldie, Cleveland Trade School, Cleveland, and co-chairman of the session, announced the following prize winners of the 1944 A.F.A. apprentice contest sponsored by the association's Apprentice Training Committee:

Patternmaking—First, Carol Winterhalter, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; second, Stephen Krajny, Pattern Manufacturers Industries of Cleveland, Cleveland; third, Robert Hurkman, Universal Foundry Co., Oshkosh, Wis.

Nonferrous Molding—First, Alvin Budnik, Wisconsin Aluminum Foundry Co. Inc., Manitowoc, Wis.; second, Fred Geboy, Lawran Foundry Co., Milwaukee; third, Otis Wilson, Nordberg Mfg. Co., Milwaukee.

Gray Iron Molding—First, Roy Ott, Universal Foundry Co., Oshkosh, Wis.; second, Leo Schnurstein, Ann Arbor Foundry Co., Ann Arbor, Mich.; third, George Jaros, 3614 Beckman Avenue, Cleveland.

In addressing the annual business and awards meeting of the A.F.A. Thursday morning, President Lee C. Wilson reported that the association membership had reached a record level of 6319, or approximately six times the total during the last war. Mr. Wilson reviewed briefly some of the more important association developments of the past year, including the approval of changes in by-laws, and the proposed revision in scope of activities of the A.F.A. Foundation. It is intended that the Foundation be concerned with promoting and co-ordinating various research projects; collecting, revising and summarizing data on outstanding foundry problems; revising and issuing special publications; maintaining a foundry

library; preparing abstracts for industry, and compiling material for use at meetings of chapter and engineering groups.

Mr. Wilson praised the work of the various committees of the association, and commented on the enlarged program of Committee 6-B-7 to include study of physical properties of iron and nonferrous foundry sands as well as steel foundry sands.

Robert E. Kennedy, A.F.A. secretary, also paid tribute to the committee members and to the 500 association members involved in preparation of the congress program. He reported continued growth in interest in chapter activities and an increase in the number of individual chapters to a new high of 27.

C. E. Hoyt, A.F.A. treasurer, presented a summarized financial report attesting to the sound condition of the association's treasury. Norman F. Hindle, assistant secretary, again announced the names of prize winners in the 1944 A.F.A. apprentice contest.

New Officers Are Elected

A cable expressing "greetings and best wishes for a successful convention from the Institute of Australian Foundrymen" was received from W. Main, general secretary of the institute, and presented by Frank G. Steinebach, chairman, A.F.A. International Relations Committee. The latter was instructed to send to the foundry groups of Australia, Brazil and Great Britain the association's affirmation of confidence in ultimate victory through the nations' united efforts.

Report of the nominating committee of new officers and directors was presented by Mr. Kennedy, and the unanimous ballot cast resulted in the following election: President, Ralph J. Teetor, president, Cadillac Malleable Iron Co., Cadillac, Mich.; vice president, Fred J. Walls, International Nickel Co., Detroit; directors for three years, Frank J. Dost, Sterling Foundry Co., Wellington, O.; S. D. Russell, Phoenix Iron Works, Oakland, Calif.; Ralph T. Rycroft, president Jewell Alloy & Malleable Co. Inc., Buffalo; Joseph Sully, president Sully Brass Foundry Ltd., Toronto, Ont., and Lee C. Wilson, general manager, Reading Steel Casting Division, American Chain & Cable Co., Reading, Pa., and retiring president of the A.F.A. Biographical sketches of these men appear on page 248 of this issue.

Annual awards of medals and association life memberships followed the election of officers, with Duncan P. Forbes, Gunite Corp., Rockford, Ill., and past president of the association, presiding over this portion of the program. Alfred W. Gregg, executive engineer, the Whiting Corp., Harvey, Ill., received the J. H. Whiting Gold Medal. William G. Reichert, president, the W. G. Reichert Engineering Co., Newark, N. J., was presented the Joseph S. Seaman Gold Medal by Herbert S. Simpson, the National Engineering Co., Chicago. A life membership awarded John Hill, president, the Hill & Griffith Co., Cincinnati, was accepted in his absence by his brother, D. N. Hill, from Lester N. Shannon, Stockham Pipe Fittings Co., Birmingham. Another life membership was tendered Herman E. Alex, Rock Island Arsenal, Rock Island, Ill., with H. Bornstein, Deere & Co., Moline, Ill., making the presentation. Further tribute was paid Mr. Alex by Maj. A. O. Harris who, as personal representative of Maj. Gen. L. H. Campbell, chief of the Ordnance Department, Washington, expressed the latter's pleasure over the honor shared by his department through the recognition accorded Mr. Alex.

Concluding part of the meeting was the presentation of the A.F.A. Foundation Lecture, "Cupola Raw Materials," by Dr. H. W. Gillett, Battelle Memorial Institute, Columbus, O. The text of Dr. Gillett's paper starts on page 132 of this issue.

Approximately 200 Canadian members of the American Foundrymen's Association attended a group luncheon in the Fillmore room of the Statler Hotel Wednesday at which C. C. Macdonald, Frederic B. Stevens of Canada, Toronto, served as chairman. Official greeting and wel-

FRANK J. DOST

Right—Five new directors of the A.F.A. elected at the congress for three-year terms. For biographical sketches of these men see page 248 of this issue

LEE C. WILSON

SAMUEL D. RUSSELL

RALPH T. RYCROFT

JOSEPH SULLY

come was extended by Frank E. Bates, chairman of the Western New York Chapter, and general chairman of the committee on arrangements. He reminded the members of the cordial relations that have existed for more than a century between the people of Canada and the United States, more cordial—if possible—now that both nations are allied in a great cause, and trusted that the visitors would find their stay in Buffalo pleasant and profitable.

Delegates from all A.F.A. chapters met Wednesday afternoon and discussed a number of problems pertaining to chapter operation. A dinner of the delegates followed with Ralph J. Teetor, vice president of the A.F.A., presiding. Frank G. Steinebach introduced the delegates present, Lee C. Wilson praised the chapters for the progress that had been made, and Mr. Teetor spoke on some of the outstanding projects undertaken by the various chapters during the year.

At a dinner which marked the closing of the 48th annual convention, Lee C. Wilson referred to the death of Secretary of the Navy Knox and asked his audience to stand for a minute in silent tribute to the memory of an able man. He congratulated Frank E. Bates and his committee for the highly satisfactory manner in which the affairs of the convention had been conceived and carried out. Incoming president Ralph J. Teetor presented past president Lee C. Wilson with a certificate of Honorary Life Membership in the association. Colonel Jack Major in a sparkling address illuminated by flashes of wit and humor presented impressions gained during a recent trip "With Our Boys In The South Pacific."

A large and interested audience of young and older foundrymen, students and educators attended one Wednesday evening session which was devoted to the general topic "Engineers in the Foundry." This meeting was sponsored by the Committee on Co-operation with Engineering Schools, which also sponsored the annual foundry instructors' dinner immediately preceding the evening session. Fred G. Sefing, International Nickel Co., New York, presided at the dinner, and C. V. Nass, Pettibone Mulliken Co., Chicago, was chairman of the following meeting.

In discussing "The Place of the Engineer in the Foundry," L. J. Fletcher, Caterpillar Tractor Co., Peoria, Ill., pointed out that in common with all other arts, the foundryman has carried his share of craft or trade secrets or traditions, but like some other arts, to the craftsmanship of the foundry there is now being added the contributions of the scientist. The craftsman seldom welcomes the scientist, but the latter will not, in fact cannot, displace the craftsman. Each needs the other, and only through the most complete and sincere co-operation can they together push forward any industry.

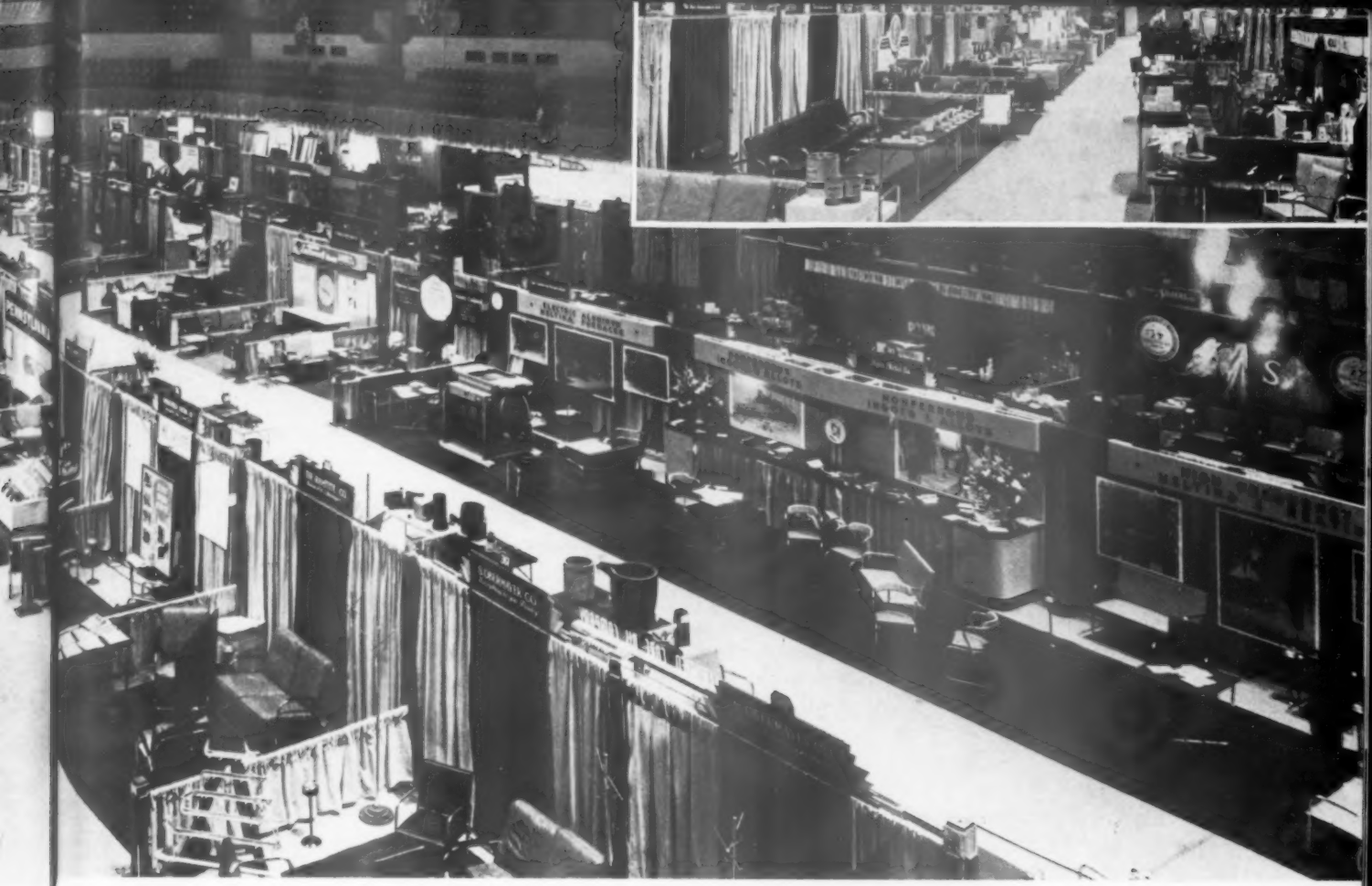
Foundry activities best suited (*Please turn to page* 158)

Heavy attendance marked all of the congress technical sessions. Views below of various meetings show: Left—Foundry sand development session; Center—Brass and bronze meeting; Right—Malleable iron symposium on gating and risering

Foundry Show attracts Exceptional Interest

THE 1944 Foundry Show held in Memorial Auditorium, Buffalo, April 24 to 28, in conjunction with the Third War Production Foundry Congress and the 48th Annual Convention of the American Foundrymen's Association, proved highly interesting to over 11,000 foundrymen representing every section of the country. Information gathered through inspection of the various displays should aid materially in meeting present production problems occasioned by war demands, and at the same time should point to the wide variety of machines and supplies which will be available to foundries for the competitive period to follow the war.

Number of exhibits of foundry equipment and supplies was the second largest in the history of the association. In spite of wartime difficulties, a surprising amount of foundry equipment was on display, and models of equipment, motion pictures, enlarged photographs, and drawings were used effectively by many in illustrating important features connected with the use of modern foundry equipment and supplies. Conversations with exhibition visitors throughout the week revealed that the entire foundry show had been both interesting and helpful in illustrating the machines and materials which are available for the production of castings. Many exhibitors ex-



pressed complete satisfaction with the results of participation in the show.

The large and spacious arena of the auditorium was completely occupied with displays of an exceedingly wide range of foundry supplies, services and some smaller equipment. Every bit of available space in the large exhibition hall on the lower level was filled with displays of foundry equipment and related materials. General arrangement of the exhibits on both levels was most attractive. An idea of the extent of the exhibits on both the upper and lower levels may be obtained from the various photographs reproduced on these pages.

A number of items of new equipment and numerous developments in the field of supplies and materials were shown for the first time at Buffalo. It is rather interesting to note that in the field of equipment, most of the new machines displayed at the 1944 show were designed primarily for use in the smaller shops. While the mechanization of larger foundries moves along at even an accelerated pace, the impression was gained at the foundry show that greater attention now is being given to the production of machines which will allow the economical mechanization of many operations in the smaller foundries. Many of the displays were de- (*Please turn to page* 250)

Pours Finned Cylinders of Alloy Cast Iron

BEGINNING in 1930 with the production of a few gray iron finned cylinders and cylinder heads for air cooled engines, the Motor Castings Co., Milwaukee, has made considerable progress in the method of manufacture, and now makes over 1500 a day in a wide variety of designs, as shown at the bottom of these pages. Since 1930 Motor Castings Co. has shipped 2,800,000 fin type cylinder castings. In many cases the castings are made to extremely close tolerances. For example the cylinder barrel for an airplane motor shown in Fig. 1 is held to a tolerance of plus 1/32-inch, minus 0 on the diameter of 5 inches or 1/64-inch on a side. Fig. 10 showing a twin cylinder opposed type air cooled engine combined with the crankcase indicates some of the complexities encountered, and all dimensions must be held to definite tolerances. Therefore, considerable care is taken in the selection and preparation of the sands as well as in molding operations.

An alloy type iron used for these castings is melted in the cupola, and the composition and physical properties will vary according to the particular application. Nickel-chromium and nickel-chromium-molybdenum irons are employed and the tensile strengths range from 30,000 to 50,000 pounds per square inch minimum. Brinell hardness number of the seats with the high strength iron ranges from 196 to 217 and specifications call additionally for ready machinability and high wear resistance in the bore. The lower strength iron will show a brinell of 179 to 200 on the seats.

Finned castings are made in core molds. The sand mixtures employed are based on long experience and experimental work. Mixture for any specific job has to be developed, since it may differ in many characteristics from others. In general the Motor Castings Co. uses five basic core mixtures including the backing sands. Sands from which those mixtures are compounded include a natural sand with 2 per cent or less clay content, lake sand, fine silica sand, and coarse silica sand. All sands are dried before mixing.

To produce a smooth surface on the castings, and also to obtain a mold which will draw cleanly from the pattern, a facing sand is used and this is followed by a backing sand to fill the remainder of the flask. One type of facing sand employed for certain finned castings is composed of 156 quarts natural molding sand, and 5 quarts linseed-base core oil. The sand is mixed 4 minutes in a sand muller to develop the desired properties. Backing sand used in connection with that facing is made up of 156 quarts lake sand, 4 quarts corn flour, 4 quarts linseed-base core oil, and 10 quarts water. Mixing time is the same as that for the facing sand.

Experience over a long period of years has indicated to the Motor Castings Co., that close control of all the variables in core sand mixtures is necessary to insure castings which will meet requirements on dimensions and appearance. Hence, all incoming sands are sampled and tested to see that they meet specifications on grain, clay, etc. In compounding the sands to meet requirements imposed by the type of casting, such factors as permeability, shear, green and dry strength, flowability, etc., must be considered carefully, and varying amounts of different sands are used to meet the specific conditions.

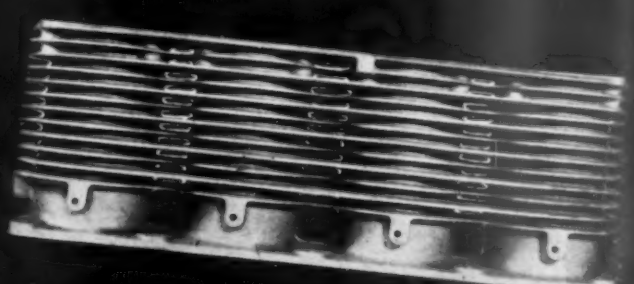
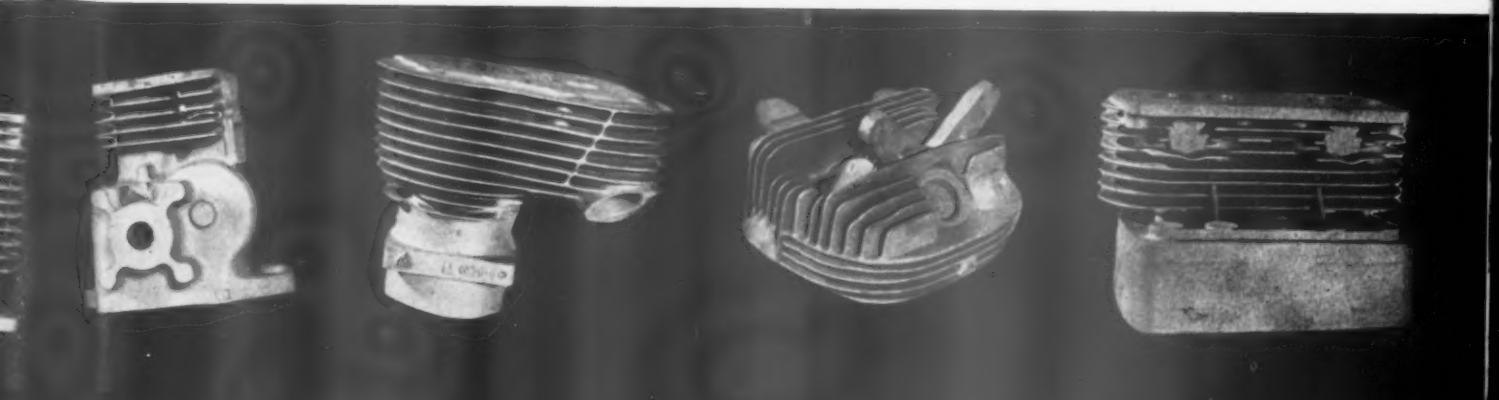


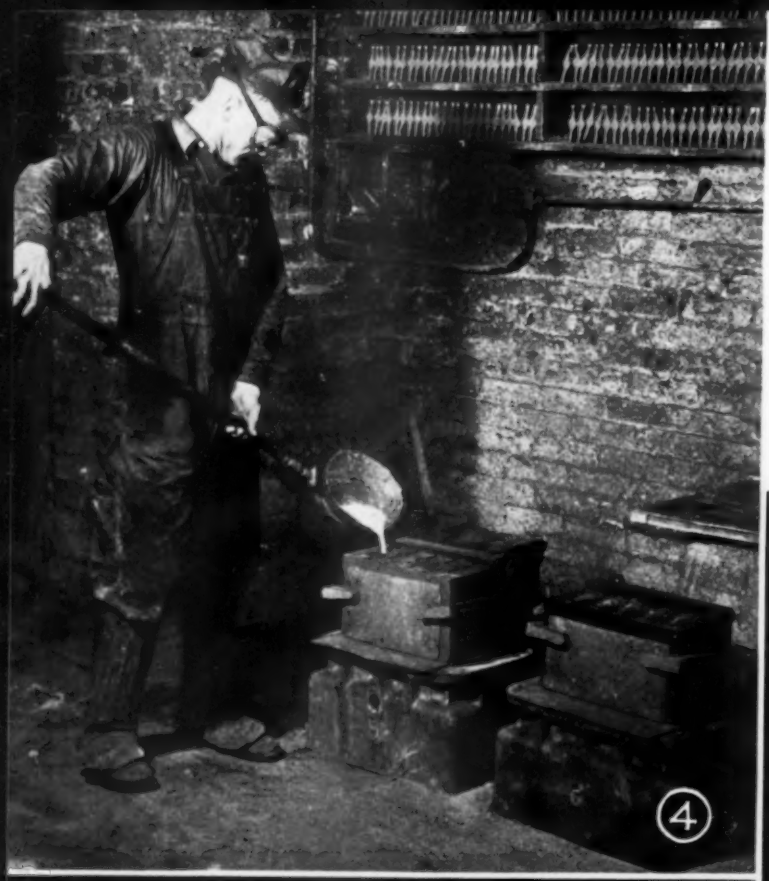
Fig. 1—Finned airplane cylinder made of high strength alloy cast iron which is giving excellent service results. Fig. 2—Drag mold for the cylinder. Fig. 3—Several molds are stacked, clamped together, and poured through gates in the sides. A pouring basin with openings at suitable intervals directs the metal to the points. The panel below shows a few of the wide variety of finned castings made by the firm

By Edwin Bremer

Time that the sand mixture is mulled also has been found to play an important part in providing desired characteristics in the final product, and for that reason the sand mixing equipment is equipped with a timing device which ejects the sand after a predetermined period has elapsed. Numerous tests are conducted on the sand mixtures from samples gathered at the coremakers benches. Such samples are taken all day; on every mix of core sand produced by the muller and results are tabulated.

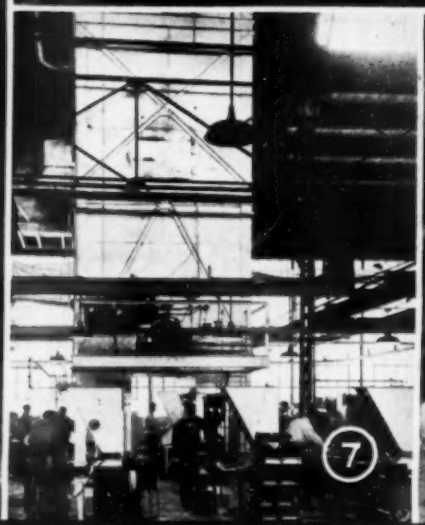
Molds and cores for the finned castings are made by hand and on jolt rollover machines. On the latter definite schedules have been set up for the number of jolts to be given to each type of casting. Fin thicknesses, depths and spacing vary considerably between different types of





castings, and to some extent on the same casting. Total draw of the pattern from the mold may be from 2½ to 4 inches and sometimes more. Fin thicknesses may vary from 1/16 to 3/16-inch, and the spacing between fins from 5/32-inch at the outside periphery to ⅛-inch at the root or casting wall.

Through careful control of sand mixtures and production methods, Motor Castings Co., is able to produce the finned cylinders and heads with but few nails in the fins to provide the necessary stiffness. Some wires are used in reinforcing the body of the cores behind the fins so that they can be subjected to the usual handling with-



out fear of breakage. Also vent wax is used rather freely to insure adequate removal of gases generated during pouring. Fig. 2 shows the drag mold for the airplane cylinder in Fig. 1, and Fig. 6 depicts the drag for the twin opposed cylinder in Fig. 10. Previous to making a mold the operator uses the air nozzle freely to make sure that the pattern and box are clean as possible. Then a sufficient amount of facing sand is placed on the pattern, and tucked into position. The reinforcing wires, nails and vent wax are set at the proper locations, and then the backing sand is put into the flask. The whole is jolted a definite number of times according to the type of casting. More backing sand is heaped on the flask, and butt rammed all over. Excess sand is struck off, the bottom board rubbed into place, clamped, and the whole is rolled over. The vibrators started, clamps are loosened, and after a few moments the mold is slowly drawn away from the pattern.

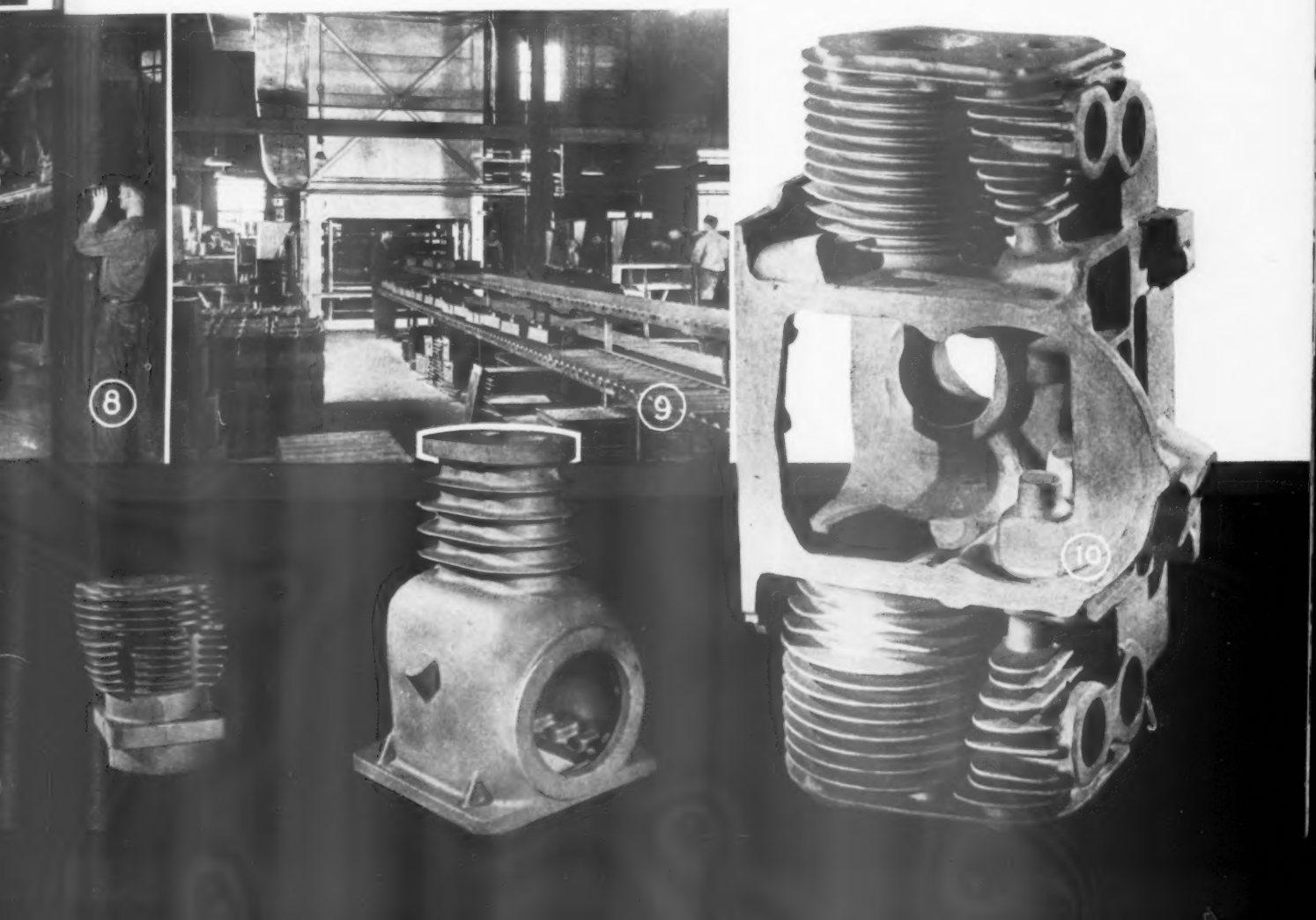
Cores and core molds are dried in a vertical oven as shown in Figs. 7 and 9. Some idea of the location of the core machines and benches in relation to the oven may be obtained from Fig. 7 and Fig. 9. Cores after baking come down on the exit side of the oven, and are placed on the roller conveyors shown in Fig. 9. As may be observed the top conveyor overhangs the two lower conveyors, and saves considerable space over that required if the three were on the same level. The two lower conveyors are used to carry the heavier molds and cores while the small cores are placed on the upper conveyor. Cores are inspected on the conveyor, and then taken to the core fitters benches or stacked or placed on shelves as the case may require.

Assembling the various cores to form a complete mold is performed by expert operators called core fitters. As may be noticed in Fig. 5, and also in Figs. 2 and 6, the drag and cope molds contain small bosses and recesses at the four corners which form definite locating points in closing the molds. The core fitters carefully inspect the molds and cores to see that they meet requirements, and that they have not been damaged by the numerous handlings they receive. Then the core fitters place the various cores in place, rubbing off high spots, etc., so that they fit properly. Paste is applied around the outside edge of the drag. The cope is placed in position and given a few raps to insure proper seating.

The final assembly or completed mold is placed on an iron plate. The next completed mold is placed on top, and the cycle continued until 4 molds are on the plate. Then a similar plate is put in position on the last mold, and the two plates are fastened or clamped together with two long rods or bolts on opposite sides. Those assemblies are picked up and trucked to the foundry. The finned castings are molded horizontally and poured vertically. Pouring sprues may be located at one end of the mold as shown in Fig. 2, or at the side as depicted in Fig. 6.

When the molds reach the (*Please turn to page* 260)

Fig. 4—Chill test bars are made from every ladle of iron. Fig. 5—Assembled mold just previous to closing. Fig. 6—Mold for twin, opposed cylinder engine. Fig. 7—Partial view of the core and mold room showing the vertical oven in the center. Fig. 8—Metal temperatures are checked at tap out and at beginning and end of pouring in the mold. Fig. 9—Another view of the core and mold room showing the runout conveyor on which the dried materials are placed after coming from oven. Fig. 10—Twin cylinder, opposed type engine casting showing the intricacy of the structure. Bottom panel shows additional types of cylinders made



Oxyacetylene Usei

By G. E. BELLEW
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Air Reduction Sales Co.
New York

RECENTLY developed applications of oxyacetylene processes in the steel foundry have provided the solution to many perplexing casting problems. Difficulties hitherto regarded as virtually unavoidable have been circumvented and large savings in time and expense have been achieved through resourceful utilization of newer methods. Introduction in most instances calls for no appreciable alteration in foundry routine.

One is the change in riser removal from hand-torch to machine-torch cutting. For some time the oxyacetylene hand torch has been recognized as a quick means of removing risers, gates, and sprues from steel castings. Now the machine torch is being introduced in its place, offering a smooth, straight cut closer to the surface of the casting, and consequently requiring less grinding.

Some idea of the saving in costs effected may be gained from a report on a recent experiment conducted on gear blanks with the express purpose of comparing the cost of hand-cutting with that of machine-torch cutting. To put the newer method to a severe test it was decided to let a highly skilled hand-torch operator compete with a machine operated by an inexperienced hand. The hand-torch operator, out to "beat the machine," made a fast close cut—slightly outdistancing the machine. However, the cut made by the machine was smooth, straight, and close to the surface of the casting. After grinding was completed and the gouges made in the surface of the casting by the hand-torch operator had been filled with weld metal, the total-cost record stood as follows: Hand cut, $1.8774; machine cut, $1.3288 or a 29% saving effected by use of machine gas cutting.

In addition, the burden on the grinding department was lightened considerably by the machine cut: 5 minutes, 21 seconds of grinding (the grinding after the machine cut could have been almost entirely eliminated in this instance if the foreman had not wished to leave a comfortable margin of safety between the cut and the surface of the casting) as compared with 11 minutes 26 seconds on the hand-cut casting. There was no necessity for repair welding after the machine cut was made. When a hand cut is made close to the surface of the casting, gouges in the surface are almost unavoidable, especially since most experienced hand-torch operators give the torch a weaving motion to help steady their hands as the cut progresses. To prevent such gouges the hand-torch operator must make his cut farther from the surface of the casting; and that means more grinding.

Other advantages have been claimed for machine gas cutting of risers. Because it does not involve continuous manipulation of the torch, it reduces operator fatigue and makes it possible for an operator to work at maximum speed all day long. For the same reason and because it requires less skill, it is suitable for use by women or inexperienced operators, a great advantage in view of the current manpower shortage. Advantages of machine gas cutting appear to increase in direct ratio to the size of the risers removed. The machine operator is not

Fig. 1—Radiagraph with radius rod and center point attachment traveling around inside inverted casting, cutting off peripheral riser. Fig. 2—Padding being removed quickly and easily from cleat casting by scarfing torch. Surface of casting remains unscathed. Fig. 3—Woman operator cutting heavy risers from casting. Cutting machine travels on track, mechanically controlling straightness of cut. Fig. 4—Circular plug riser being cut out by stationary torch. Casting revolves on turntable driven by variable speed motor. Fig. 5—Operator gouging out imperfections from large valve casting

seriously affected by the vast amount of heat released in cutting through a heavy riser.

Machine gas riser-cutting set-ups fall for the most part into two classifications: Straight-line and circular. In straight-line set-ups, a radiagraph travels along a straight track to make the cut. In the instance shown in Fig. 3 the casting is simply propped up on its side ready to receive the cut.

Circular set-ups may be divided roughly into two groups; namely those in which the torch travels around the work and those in which the work rotates around or past the torch. The first is well suited to cutting away large circular risers like the one in Fig. 1. The smoothness of the cut on the job shown was an excellent recommendation for the set-up used.

Considerable use has been made of metal table tops, rotating at controlled speeds around or past the tip of a stationary torch. Smaller castings like the one in Fig. 7 may be cut conveniently in this manner. Two concentric risers were removed from the casting shown—merely by slightly altering, between cuts, the position of the torch and changing the direction of the tip. A slight

...se in the Steel Foundry

variation on the same theme, Fig. 4, is provided by the cutting cut of a plug riser from the center of a casting mounted in a fixture on a rotating table top.

In connection with unusual or special set-ups it is worth noting that proper use of jigs and fixtures in conjunction with machine gas cutting offers an opportunity for further speeding and simplifying production of such jobs. More often than not, however, there is no need for any sort of jig or fixture in conjunction with machine gas cutting of risers.

Set-ups ordinarily present no problem. A little shop ingenuity should answer the question of how to position castings for most efficient cutting.

Removal of pads from castings may be accomplished by "scarfing" or cutting away with a specially designed oxyacetylene scarfing torch. In a recent test on armor plate castings, padding was removed in 30 minutes by scarfing. An interesting fact about the oxyacetylene process is the elimination by its use of any need for moving the work from one department to another. This results naturally in a considerable extra saving in time, manpower, handling costs and equipment, etc. Also, because the torch does not depend for its principal effect on the heat it dispenses, there is little chance of its melting any part of the surface of the casting—actually no chance at all if the scarfing operator has been instructed properly. A casting may be scarfed to size maintaining the proper contour. Fig. 2 shows a typical foundry scarfing operation in progress.

Various mechanical means have been employed to gouge out defects in steel castings preparatory to refilling them with weld metal. A comparatively new development along this line is the (*Please turn to page* 254)

Fig. 6—Valve casting being descaled rapidly by oxyacetylene flame. Fig. 7—Circular casting with two concentric risers cut off cleanly and evenly. Casting mounted on turntable rotates past stationary torch directed first at one riser then at the other. Fig. 8—Operator at left using gouging torch to remove imperfections, with repairs later completed by welding

The Foundry Industry *Looks to the Future*

A STUDY OF WARTIME CHANGES AND POSTWAR PLANS

STRIKING changes have taken place in the foundry industry of the United States since late in May, 1940, when the president created the National Defense Advisory Commission. To meet the tremendous war demands for castings to be used by America and her allies, foundries have been called upon to expand facilities greatly through new plants, additions, and the installation of more efficient equipment. Changes in war strategy have forced fluctuations in castings demand with the result that a sizeable number of foundries have converted their facilities to the production of castings of other metals. Foundrymen have found it necessary to improvise in the face of shortages of vital raw materials and supplies; they have had to develop more efficient rigging to overcome labor shortages; and they have had to develop new practices and improve older methods in order to produce castings that met specifications which constantly have grown more stringent. The record of accomplishment should be a source of gratification to every foundryman and every foundry worker.

But what has been the effect of these changes on the industry? Are foundries keeping up with war demands today, and if not, what are the hampering factors. What do foundrymen think of the prospects for the production of castings in the period following the close of the war? To provide answers for such questions and to gain a better insight into some of the developments of the industry, THE FOUNDRY recently undertook a comprehensive study of all foundries in the United States. Each firm was asked a number of questions, including the following:

1. Do you expect to be able to maintain your present level of employment and production after the war?
2. Has the capacity of your foundry been increased since January, 1942. If so, how much?
3. What is your present operating rate in per cent of plant capacity?
4. How many months will orders on hand or promised keep you operating at that rate?
5. Approximately how many employes did you have in your foundry and pattern shop on March 1, 1944?
6. Are you able to secure a sufficient number of skilled and unskilled workers to meet your needs?
7. Since Pearl Harbor have you been producing castings in different metals than formerly employed. Do you expect to make castings of the new metals following the war?
8. Have you made developments in the castings you produce or in your production methods which will help you meet postwar competition?
9. When priority restrictions are removed, do you expect to purchase a fair amount of equipment to replace worn out or obsolete machines, or to expand facilities?

The response to this request for information has been indeed gratifying, and the Editors of THE FOUNDRY take this opportunity to express deep appreciation to all of the foundrymen who expended time and effort in supplying complete

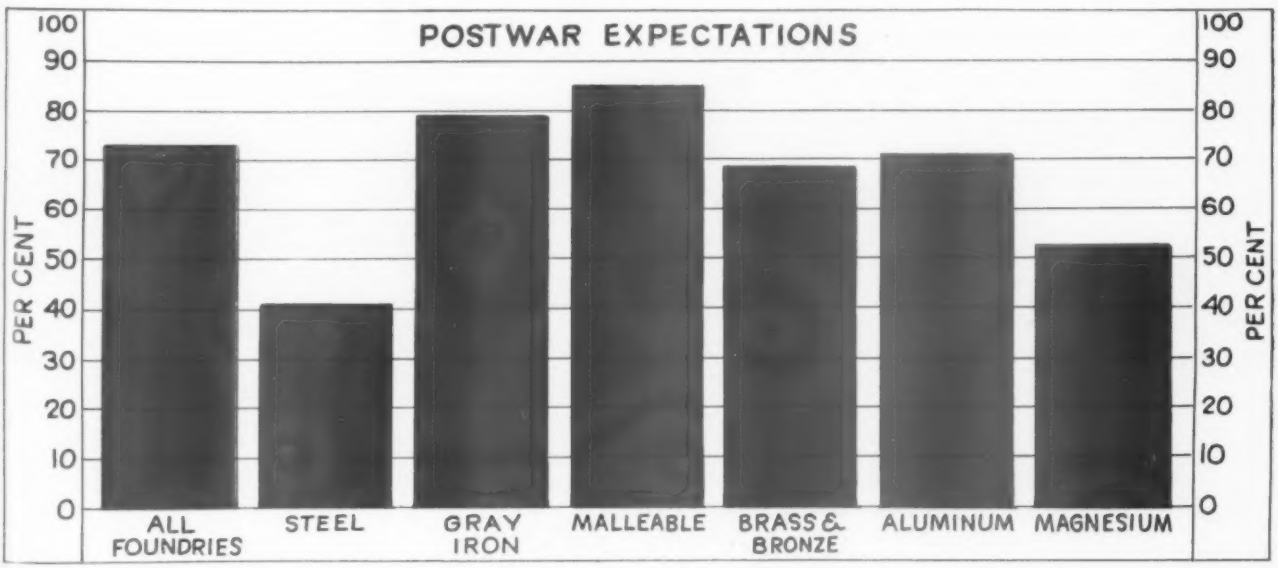


Fig. 1—Percentage of foundries expecting to maintain present production and employment rates after the war

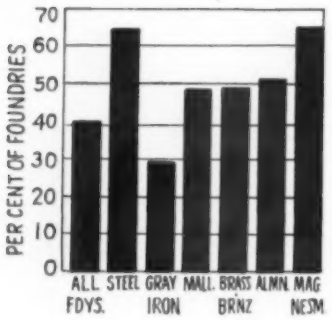


Fig. 2—Percentage of foundries which increased their capacities since January, 1942

Table I—Percentage of Increase in Capacity

Amount of Increase	All Foundries Per Cent	Steel Per Cent	Gray Iron Per Cent	Malleable Per Cent	Brass & Bronze Per Cent	Aluminum Per Cent	Magnesium Per Cent
25%	15.8	23.6	13.1	31.0	17.5	16.5	6.5
50%	12.4	17.0	9.2	8.6	16.4	18.8	25.8
75%	3.1	3.3	1.7	1.7	4.6	5.1	9.7
100%	6.6	17.6	3.6	3.5	8.7	9.3	9.7
Over 100%	1.1	2.6	0.7	1.7	1.2	1.2	12.9

answers to the questions, and made this study possible.

The questionnaire was sent to all foundries listed in *Penton's Foundry List* and replies were received from slightly over 1800, or approximately a 40 per cent response. With such a splendid return, and with the knowledge that the co-operating foundrymen represent an excellent cross-section of the structure of the industry, it is perfectly safe to extend the percentages developed in this study to cover the entire foundry industry.

What do foundrymen think about the prospects for the sale of castings in the postwar period? Never forgetting the basic character of castings in industrial production, 73.9 per cent of all foundries anticipate being able to maintain present levels of employment and production after the war. In the various branches of the industry, the expectancy is as follows: Steel 41.8 per cent; Gray Iron 79.6 per cent; Malleable Iron 85.7 per cent; Brass and Bronze 68.8 per cent; Aluminum 70.9 per cent and Magnesium 53.3 per cent. This comparison is shown in Fig. 1. An interesting relationship is to be found between expansion of production facilities and anticipated ability to maintain production levels when peace comes.

Since the Pearl Harbor attack, about 40 per cent of all foundries have increased their capacity. As might be expected, the heaviest expansion took place in magnesium and steel foundries, and the lowest capacity increase occurred in the gray iron industry. As indicated in Fig. 2, the study shows that 64.1 per cent of all steel foundries expanded during the period, 29.4 per cent of the gray iron industry, 48.3 per cent of the malleable industry, 48.7 per cent of brass and bronze foundries, 51.3 per cent of aluminum foundries and 64.5 per cent of magnesium casting shops. Going back to the problem of postwar employment and production, it will be seen that, in the main, those industries which expanded the most now are the least optimistic, while the gray iron industry, which expanded the least, approaches the future with greater confidence. The exception to the general rule is found in the malleable industry, where recent tremendous demands for malleable castings seemingly have created considerable confidence in the future.

Most Increases 25 to 50 Per Cent

Most of the foundries which increased their capacities the past 2½ years enlarged their potential output 25 to 50 per cent. As shown in Table I, 15.8 per cent of all foundries have expanded their capacity 25 per cent, while 12.4 per cent of the industry has been increased 50 per cent. Only 3.1 per cent of all plants have been enlarged 75 per cent, but 6.6 per cent of all foundries have been doubled in capacity. Increases of more than 100 per cent represent only 1.1 per cent of all plants.

This expansion pattern is fairly uniform throughout the various branches of the industry, except among magnesium foundries. Reflecting the sharp upturn in war needs of magnesium castings, 12.9 per cent of all magnesium foundries have more than doubled their capacities, 9.7 per cent have expanded 100 per cent, 35.5 per cent show a 50 to 75 per cent growth, and 6.5 per cent of the plants have been enlarged 25 per cent.

Replies to the query on current operations, as shown by Fig. 3, indicate that about 70 per cent of all foundries are running at more than 50 per cent of capacity and that most of this group is operating between 70 and 100 per cent of

Table II—Operations in Per Cent of Capacity—March, 1944

Operating Rate	All Foundries Per Cent	Steel Per Cent	Gray Iron Per Cent	Malleable Per Cent	Brass & Bronze Per Cent	Aluminum Per Cent	Magnesium Per Cent
0- 10%	1.2	. . .	1.2	. . .	2.1	1.4	
11- 20%	2.1	.8	2.7	1.8	2.3	2.6	3.6
21- 30%	4.8		6.3	. . .	3.9	3.6	6.4
31- 40%	4.7	1.6	5.4	. . .	4.9	3.2	3.2
41- 50%	16.7	6.5	19.6	6.9	16.2	15.4	6.4
51- 60%	9.1	6.5	11.0	8.6	7.2	7.3	3.2
61- 70%	8.6	5.7	10.0	27.6	5.9	6.1	6.4
71- 80%	21.9	28.5	20.4	31.0	20.6	23.9	25.8
81- 90%	9.3	15.4	7.5	8.6	9.8	10.1	9.7
91-100%	21.6	35.0	15.9	15.5	27.1	26.4	35.5

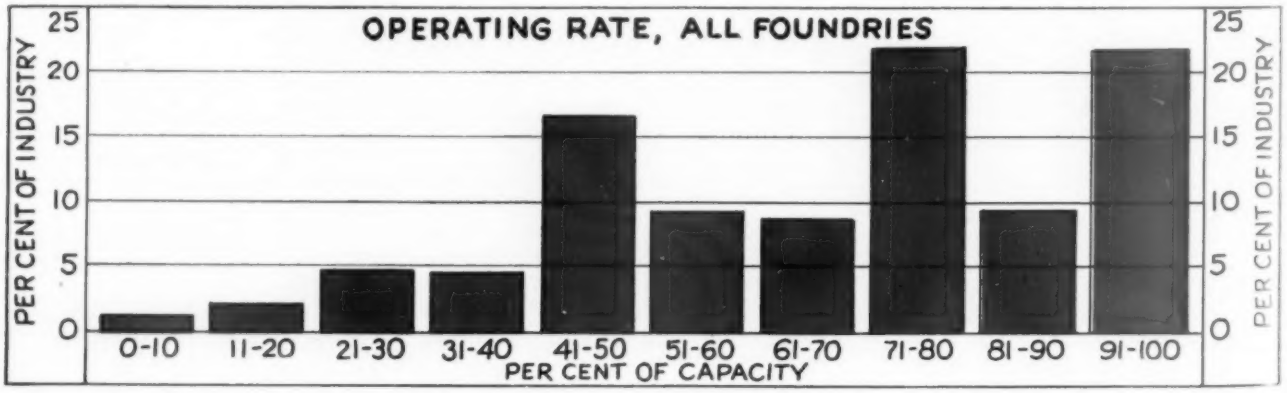


Fig. 3—Percentage of foundries operating at indicated rates in March, 1944

Table III—Foundry Employment—March, 1944

Number of Workers	All Foundries Per Cent	Steel Per Cent	Gray Iron Per Cent	Malleable Per Cent	Brass & Bronze Per Cent	Aluminum Per Cent	Magnesium Per Cent
Over 1000	1.3	6.6	.5	3.6	.5	1.2	10.3
500-1000	4.5	17.8	2.9	17.9	2.3	3.5	24.1
250- 500	5.9	19.8	6.3	21.4	2.6	2.8	6.9
100- 250	16.3	32.2	17.8	42.8	10.7	10.4	13.9
50- 100	18.4	11.1	21.9	8.9	15.8	15.7	20.6
25- 50	17.6	4.6	19.9	1.8	17.2	17.1	10.3
Under 25	36.0	7.9	30.7	3.6	50.9	49.3	13.9

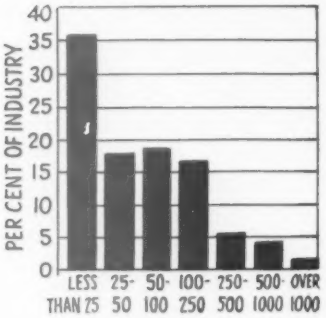


Fig. 4—Percentage of all foundries employing indicated numbers of workers

capacity. Approximately one plant in ten is at 20 to 40 per cent, with relatively few foundries, 3.3 per cent, doing less than 20 per cent.

Analysis of Table II shows that, as a group, steel foundries are in a higher operating bracket than other types, nearly 80 per cent of all steel foundries reporting operations of 70 per cent of capacity or better. On the other hand, 70 to 100 per cent schedules are shown for only about 44 per cent of all gray iron foundries. Malleable foundries, which would be expected to fall largely in the top operating levels, apparently still are restricted by manpower difficulties, since 27.6 per cent of all plants indicate schedules of 60 to 70 per cent, and only about 55 per cent of them are running better than 70 per cent. Magnesium foundries rank next to steel foundries in most complete utilization of facilities, with 71 per cent of all plants operating at more than 70 per cent. Slightly more than 60 per cent of all aluminum foundries and 57.5 per cent of all brass and bronze foundries show schedules in the 70-100 per cent range.

Near-Future Operating Prospects Vary

How long foundry operations can be maintained at present levels depends to a large extent, of course, on war developments, but a wide variation prevails in the probable duration of current schedules on the basis of existing and prospective orders. For example, 22.8 per cent of all foundries report enough business to continue for 1 to 2 months, but more than 20 per cent indicate that their backlogs and promised orders will maintain schedules for 8 months or more. Another 22 per cent expect to hold present operations for 6 to 7 months, 15 per cent for 4 to 5 months and 19.9 per cent for 3 months.

Analysis of the figures for prospective operations in the immediate future indicate that forward buying has been more extensive in malleable castings than in other types. More than 68 per cent of all malleable foundries can continue present operations for 6 months or more, whereas only 44 per cent of the steel foundries, 42 per cent of the gray iron foundries, 43 per cent of brass and bronze plants, 42 per cent of the aluminum shops and 48 per cent of the magnesium foundries have a similar outlook.

Data compiled on the number of employes in foundries on March 1, 1944, are interesting in that they emphasize the predominance of the small plants. As shown by Fig. 4, foundries employing less than 25 workers represent 36 per cent of the industry; 17.6 per cent of all foundries have 25 to 50 workers, and 18.4 per cent have 50 to 100. This means that 72 per cent of all plants have 100 or fewer employes. Naturally there is considerable variation in number of employes among different types of foundries, as indicated in Table III. Steel foundries generally are large units, as indicated by the fact only 23.6 per cent of them have employment of 100 or less. Likewise, only 14.3 of all malleable foundries show employment in that range. On the other hand, the small plant is typical of approximately 73 per cent of all gray iron foundries, 84 per cent of brass and bronze foundries, 82 per cent of aluminum foundries and 45 per cent of magnesium foundries.

As depicted by Fig. 5, the large majority of foundries report manpower difficulties in attempts to secure a sufficient number of both skilled and unskilled workers. Only 18.5 per cent of all foundries indicate that the supply of the former is adequate for their needs, while only 21 per cent have been able to obtain a sufficient number of unskilled workers. The employment experience of different types of foundries is fairly uniform, although malleable plants are experiencing relatively the greatest difficulty in filling their staffs.

More than 17 per cent of all foundries have turned to production of castings of new metals since Pearl Harbor, and about three-fourths of this group indicate they expect to continue such work after the war. As would be expected, these figures reflect the entry of a number of plants into the magnesium casting industry. However, the new metals producers

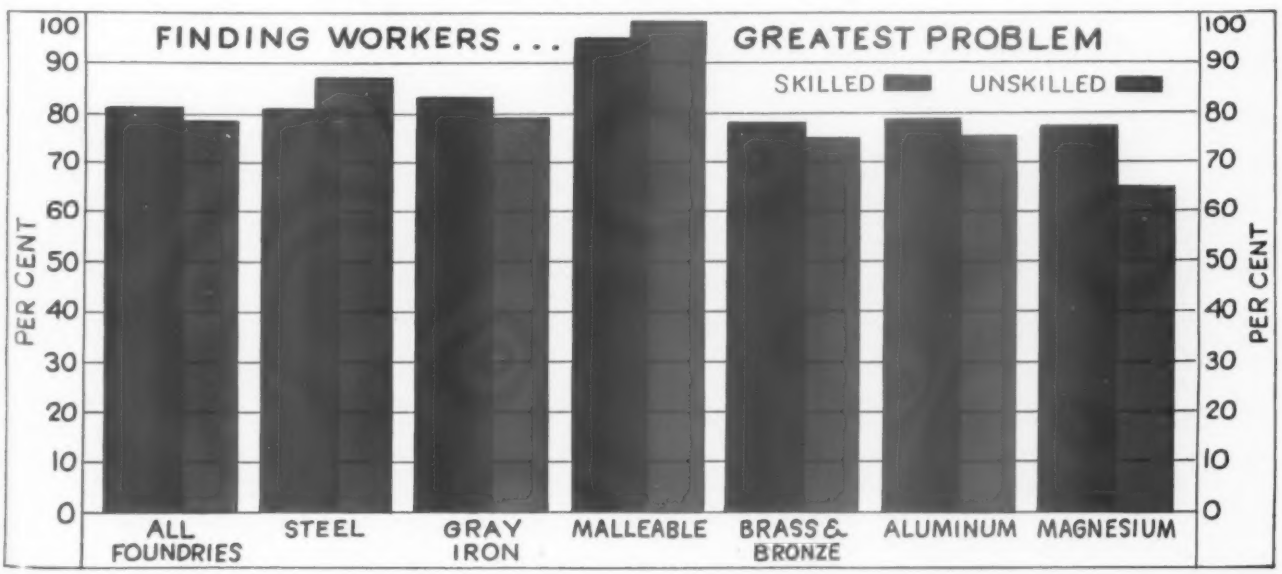


Fig. 5—Percentage of foundries having difficulty securing sufficient number of workers

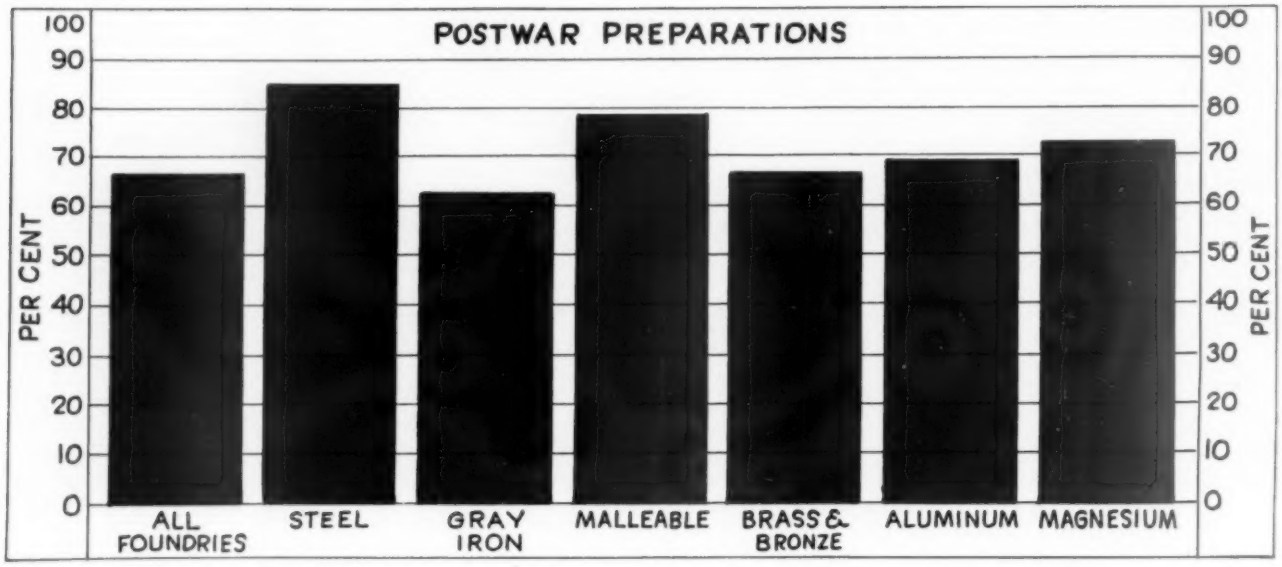


Fig. 6—Percentage of foundries taking steps expected to help meet postwar competition

also include 27 per cent of all aluminum foundries, 25 per cent of brass and bronze plants, 22 per cent of steel foundries, and 12 per cent each of malleable foundries and gray iron foundries.

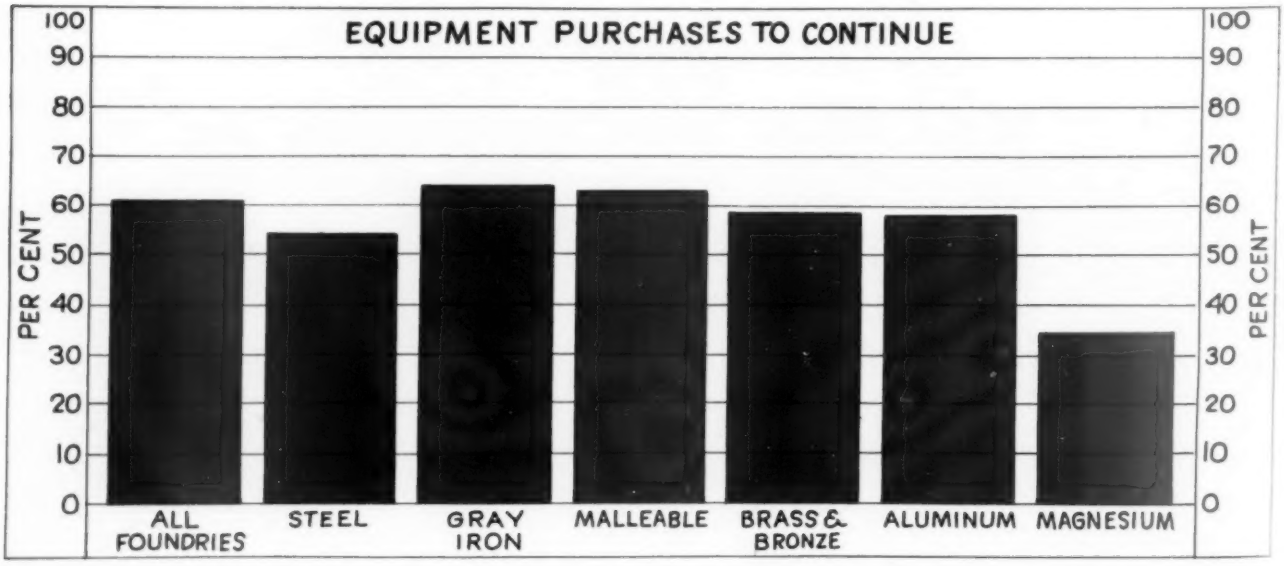
Approximately two-thirds of all foundries have taken steps which they expect to be beneficial in meeting postwar competition. All types of foundries have participated in these developments, as indicated by Fig. 6, although steel foundries head the list with 85.7 per cent reporting developments having postwar significance. Percentages for other types of foundries are: Gray iron 63.1; malleable 78.8; brass and bronze 66.7; aluminum 69.5, and magnesium 72.4.

These steps which are expected to aid postwar operations consist principally of the installation of new equipment, adoption of improved foundry practice, and development of an improved product. Almost 29 per cent of all foundries report installation of new equipment, 20.6 per cent have bettered their practice, and 6.7 per cent claim to have improved their product. Other moves expected to prove beneficial are: Better plant layout; erection of new buildings or additions; adoption of better operating supervision, and use of better patterns.

The majority of foundries intend to purchase new equipment to replace worn out or obsolete machines, or to expand facilities, when priority restrictions are removed. Approximately 61 per cent of all foundries indicate this intention, as shown by Fig. 7, although the percentages for different types of foundries vary according to the amount of equipment bought the past 2 years. For instance, only 34.5 per cent of the magnesium foundries and 54.1 per cent of the steel foundries are prospective buyers, whereas 64.1 per cent of the gray iron plants expect to enter the market as soon as possible. Buying inclinations are indicated for 58.7 per cent of all aluminum foundries, 58.8 per cent of brass and bronze foundries, and 63.6 per cent of malleable foundries. Choice of equipment expected to be purchased is spread fairly evenly over all of the more important units, including melting and heat treating furnaces, molding and core making machines, ovens, shakeout equipment, material handling equipment, blast cleaning equipment, dust arrestors, sand preparation equipment, and x-ray and other types of inspection facilities.

(The second article on this survey, relating the data according to size of plants, will appear in the July issue.)

Fig. 7—Percentage of foundries planning to buy new equipment when priorities lifted



(Extra copies of this survey may be obtained on request to The Foundry, Penton Building, Cleveland 13)

Melts 100 Tons of Bronze Daily

By PAT DWYER
Engineering Editor
THE FOUNDRY

THE NATIONAL BEARING METALS CORP., a subsidiary of the American Brake Shoe Co., was organized in 1927 from a group of eight large brass foundries operating in St. Louis, Meadville, Pa., Jersey City, N. J., Pittsburgh, Portsmouth, Va., St. Paul and Chicago. On an 8-hour daily schedule the combined melting capacity is approximately 600,000 pounds for the production of all types of nonferrous castings and bearings, with the predominant tonnage supplied to railroads, industrial plants and electric railroads in the order indicated. At present and for some time past, the majority of the castings are for naval and military requirements. All plants employ complete equipment for production of nonferrous castings in a large variety of alloys, shapes and weights.

The foundry portion of the St. Louis plant, 130 x 360 feet, with a core room 40 x 71 feet at one side, is the largest in the group, with an approximate daily melting capacity of 100 tons. For some time, in addition to the regular facilities, this plant has operated a centrifugal casting department with a daily capacity of 15,000 pounds. Plans are in progress for installing similar equipment in the other plants operated by the corporation. The chemical and physical laboratory in the St. Louis plant, recently greatly enlarged and fully equipped with the most modern apparatus, is supervised by a staff of highly trained engineers and technicians providing for continuous research and improvement in the art of producing outstanding articles for nonferrous casting and bearing fields.

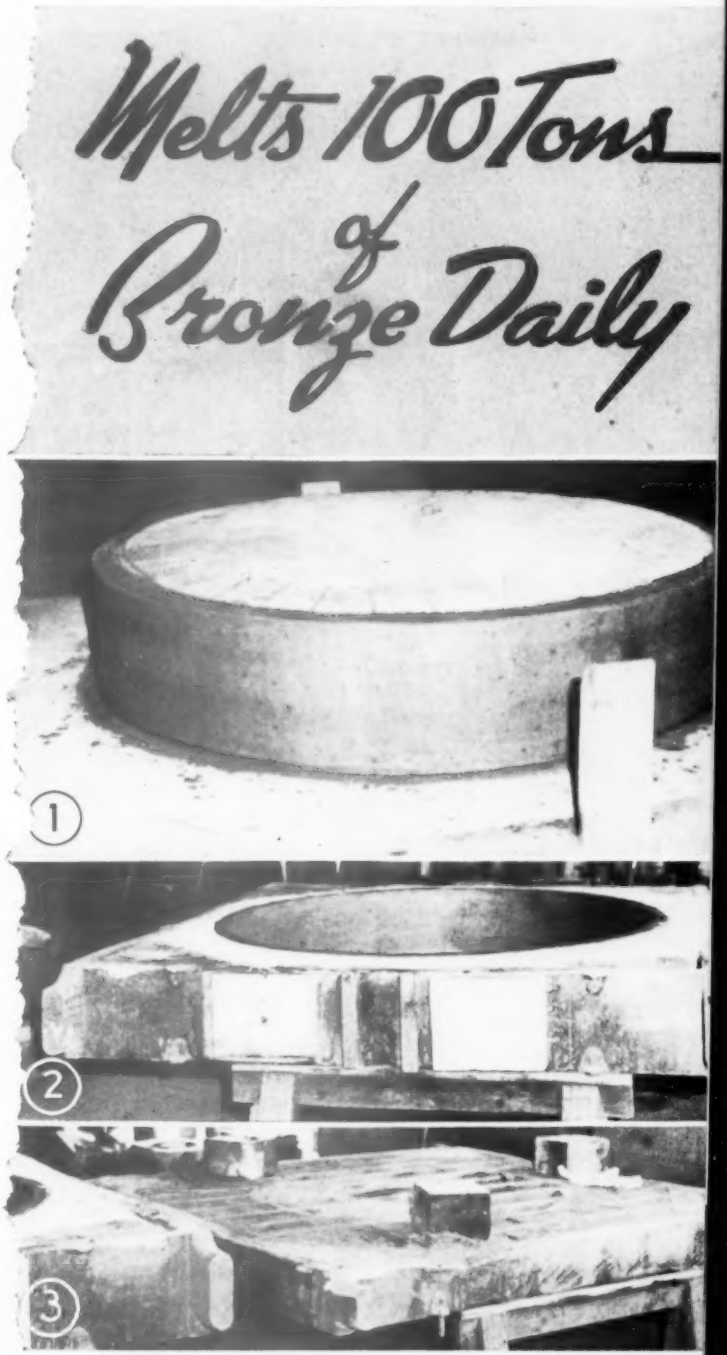


Fig. 1—The pattern leaves its own green sand core standing on the drag. The surface is nailed, black washed and skin dried. Fig. 2—After the pattern is drawn out of the sand, the cheek is lifted off, placed on trestles, finished and skin dried. Fig. 3—Three dry sand pouring basins on top of the cope receive metal from three crucibles simultaneously to insure uniform temperature in the ring casting

Fronting on Manchester Avenue, the plant extends south into Mill Creek valley through which nearly all railroads flow westward out of St. Louis. Loading and unloading platforms with a capacity of 10 cars inside the plant are served by two branches of a spur track leading to the main line of the Missouri Pacific railroad. The plant includes a machine shop, pattern shop, pattern storage, white metal department, lining shop, two-story store room, laboratory, reclamation department and foundry. A basement under the pattern storage building serves as a wash and locker room. One section is operated as a cafeteria where lunches are served at nominal cost. Influx of female employes during the past two years has introduced other innovations not contemplated when the plant was built in 1927 or during the many years it was operated as a strictly masculine establishment.

Three rows of steel columns spaced on 20-foot centers support the foundry roof. Also on the majority of floors they support crane runways. Equipment for melting and transporting the metal is exceptionally efficient and is housed in one section of the main foundry building. The roof over this section is 20 feet higher than the roof over the remainder of the building. It is formed principally of glass, and this feature combined with the extensive windows in the side walls insures practically full daylight conditions on the floor. Several stacks in the V-shaped roof of furnace bay, provided with motor driven exhaust fans, remove all smoke and dust incident to the operation of the battery of furnaces, and over the floors where metal is poured and castings are shaken out.

In winter the building is heated by steam unit heaters suspended along the west wall. Air drawn in through

these heaters creates a constant current flowing in the direction of the furnace room. In summer cold air is drawn through the same units. The brick wall of the building is only 4 feet high. Remainder of the space up to the edge of the roof is occupied by a continuous window along both sides and one end. Center sections of the window sash in the walls and furnace room roof are movable and may be adjusted to promote circulation of minimum. Also the various classes of castings are made on certain floors so that metal may be melted in the nearest furnace. Two 1½-ton traveling cranes in the furnace department are employed principally in charging the large tilting furnaces with scoops in which the charge materials are assembled. Jib cranes attached to the columns in front of the furnaces swing the crucibles from under the furnace spouts and place them within reach of

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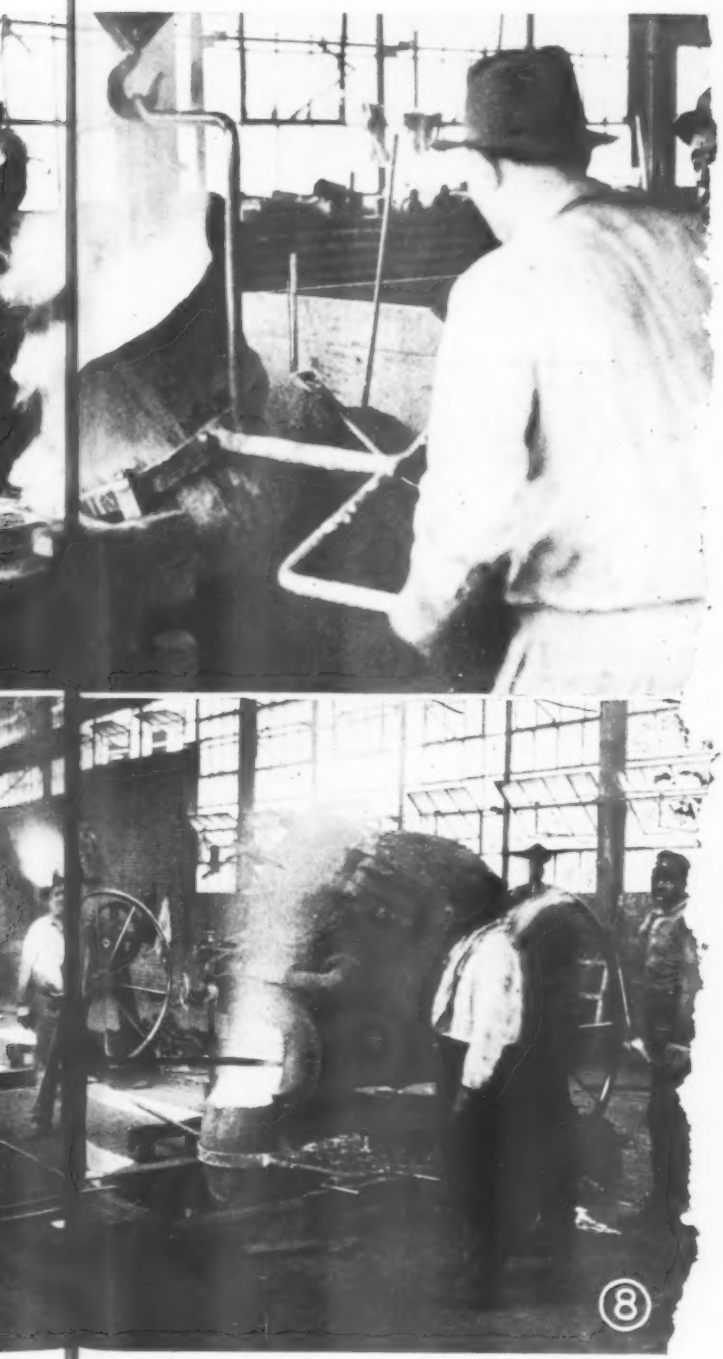
the air from the outside. Windows in the saw tooth roof over the molding floors may be adjusted in a similar manner by control chains manipulated from the floor.

Only a row of steel columns separates the furnace department from the molding and pouring floors. The furnaces are disposed in such a manner that the distance to which molten metal must be conveyed is reduced to a the hoists in the various molding bays. Most of the metal is poured from large crucibles with capacity ranging from 400 to 700 pounds. Exceptionally large castings are poured from the worm and gear type ladle used in the gray iron foundry.

Metal is melted in a battery of 11 gas-fired, open-flame furnaces of the tilting type. Two are rated at 3000

pounds per charge, two at 5000 pounds, four at 2500 pounds and three at 1500 pounds. Under ordinary conditions these figures are adhered to closely, but in emergencies they have been exceeded to an astonishing extent. Although presently fired by natural gas, standby oil burner equipment and fuel oil storage is maintained for prompt conversion should emergency interruption occur.

Three batteries of pit type crucible furnaces supplement the large gas fired furnaces and provide a flexible melting link for the accommodation of short orders and special mixtures in large or small quantities. One battery with six and one with eight are located close to the east wall, while a third battery of five furnaces occupies space at the south end of the furnace bay. The six-hole pit in which the No. 70 pots are used is served by a small electric hoist suspended from a rail. The other two furnace batteries in which the pot weighs approximately 700 pounds are served by 1-ton electric hoists suspended from rails and controlled from the floor.



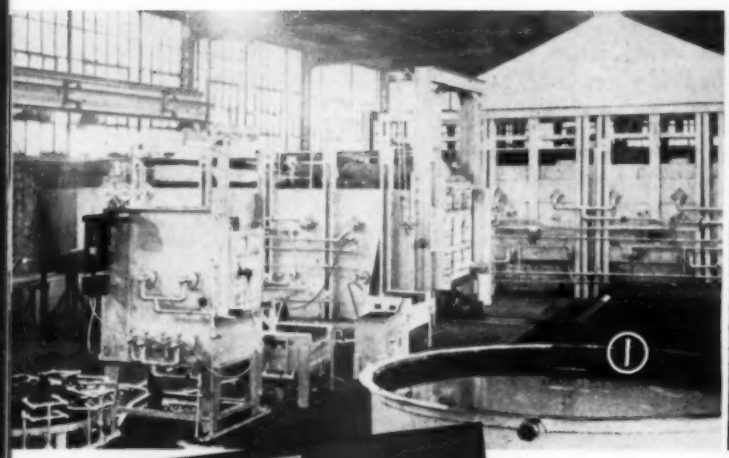
Lower part of the crucible tongs is forged carefully to fit the contour of the pot and to grip it closely and simultaneously at the top, the center and near the bottom. In this manner the strain incident to lifting a large quantity of molten metal in a more or less fragile container is distributed. Also with a grip of this character the pot cannot tip over. A lever is adjusted to serve as a latch or lock to hold the two members of the tongs rigidly in position.

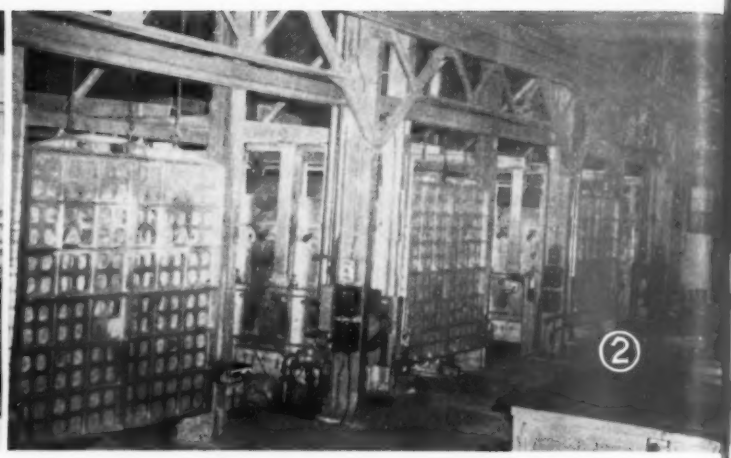
Charges are made up in a storeroom adjoining the foundry on the east. Scrap from various reliable sources, mostly railroads, also new metal, are kept in a series of bins suitably marked for identification. Analysis of the material is on file at all times and the mixtures are made up to meet definite specifications.

Fig. 4—Department in which railroad bearings are machined, finished and lined with babbitt. Fig. 5—Large bronze castings are poured from the type of ladle usually associated with gray iron foundries. Fig. 6—Melting department occupies a bay extending the full length of the building, well lighted and ventilated. Fig. 7—Bearings and other types of castings are made in hinged metal molds heavily ribbed on the outside and provided with dry sand pouring cups. Fig. 8—Ample space is provided around the battery of open flame furnaces equipped with gas burners. The furnaces readily may be converted to oil burners if necessary

The molding floor is divided longitudinally through the center by a 10-foot gangway. The entire floor, smooth and level, is surfaced with wood blocks, except for the aisle which has concrete surface, facilitating the movements of the various employes in setting up, pouring and shaking out the castings, and afterward in the removal of the castings by tote box and power lift trucks to the cleaning department. Molds are shaken out where they are poured. The sand is cut over near the molding station and the castings dragged out and placed on the gangway or directly on a truck. Most of the floors between the gangway and the wall are equipped with molding machines, operated either by hand or by compressed air. The molds are arranged in long rows on elevated stands for the convenience of the men pouring the metal. Four rows of stands are provided on each floor so that pouring at some point is going on continually. Electric current is purchased and is controlled by a switchboard in a centrally located room which also contains three air compressors, having total capacity of approximately 1000 cubic feet per minute. Source of all power, electrical and pneumatic so centralized is maintained under the direction of a competent engineer.

Several floors between the gangway and the melting department are arranged for hand molding. The molds are made on benches erected in the vicinity of the steel columns. These floors are kept (*Please turn to page* 280)





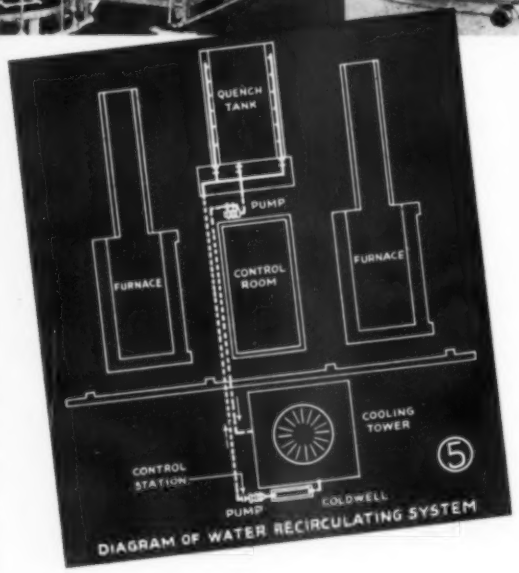


DIAGRAM OF WATER RECIRCULATING SYSTEM

Problems in WATER QUE

PRIOR to 1931 only 3 per cent of Continental Foundry & Machine Co.'s castings production was water quenched and drawn. In 1932 the company started quenching large castings and by 1939, 60 per cent of the casting production was being water quenched and drawn. In the foundry known as the No. 2 Foundry of the company, at East Chicago, Ind., where medium sized castings ranging up to 2500 to 3000 pounds are poured, about 80 per cent are water quenched and drawn and of these, 50 per cent of the smaller castings of about 100 to 300 pounds are given a preferential heat treatment. These figures are for the year 1939. Due to the fact that this company is now producing an appreciable amount of armor castings, present figures would be out of balanace with what would be considered normal.

The furnaces used for heat treating are all car-type, side gas-fired furnaces, the design being such that the same furnaces can be used for the quenching and the draw treatments. There are two banks of burners, one towards the top and pointing up towards the contour of the roof, and others located above the car hearth so that it is necessary to load castings or racks of castings on blocks or stools of approximately 12 inches in height. These stools are made of a high carbon-chrome metal, the life of which is about six months. The use of refractory stools has not been found satisfactory.

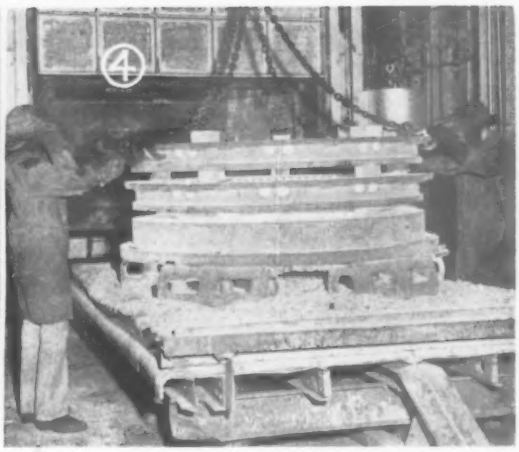
These furnaces are gas fired, burning a 980 B.t.u. gas, and for control purposes they are divided into six zones, three on the top and three on the bottom, each zone being controlled by one control couple. With these furnaces is obtained a control of approximately plus or minus 10 degrees at 1000 degrees Fahr., plus or minus 5 degrees at 1300 degrees Fahr., plus or minus 5 degrees at 1600 degrees Fahr., and plus or minus 8 degrees at 1850 degrees Fahr.

There are two roamer couples on each side in order to facilitate checking all areas of all zones. These are used extensively for operating temperatures below 1300 degrees Fahr.

One of the main problems in the heat treatment of miscellaneous sized steel castings is that of maintaining a uniform temperature throughout the furnace. Most of the medium or medium-large sized castings, up to approximately 2000 pounds, are quenched on racks, and due to the design of many of these castings it is impossible to get ideal uniformity of loading. Therefore, the heating control must be flexible. In order to control the uniformity of heating and holding, there are smaller spuds on the low burners, and there are four burners for each side of each zone. The by-pass valves on these burners can be set as low as one-pound pressure.

As stated previously, in order to prevent the flame from hitting high loads, the top burners are slanted upwards to follow the contour of the roof. Of course, the type of load governs the adjustment of the burners, but on most draw loads the bottom burners only are used.

In addition to the burner controls there are two flues at the bottom of each zone on each side of the furnace. These flues are located flush with the stool height above the car top. The dampers on these flues are regulated according to the characteristics of the load. All burners



This second of a series of articles on water quenching of steel castings describes the practice followed at the author's plant in treating castings of miscellaneous sizes. The paper was presented at the annual meeting of the Steel Founders' Society of America.

By W. B. LIBERT
Metallurgical Engineer
Continental Foundry & Machine Co.
East Chicago, Ind.

...ENCHING
...Miscellaneous Sized Steel Castings

Fig. 1—Large and small heat treating equipment

Fig. 2 — Car type furnaces and quench tank used in the water quenching heat treatment. The same furnaces can be used for the quenching and the draw treatments

Fig. 3—Carefully blocked castings being removed for the quenching operation. Castings must be loaded in such a manner that will not pocket steam during the quenching and not pocket water upon being lifted from the quenching media

Fig. 4 — Blocking up a large casting for uniform heating. Blocks or stools are made of high carbon-chrome metal

Fig. 5 — Diagram of water recirculating system

Fig. 6—Quenching castings by use of a rack.

Fig. 7 — Water quenching operation. Note safety equipment on men

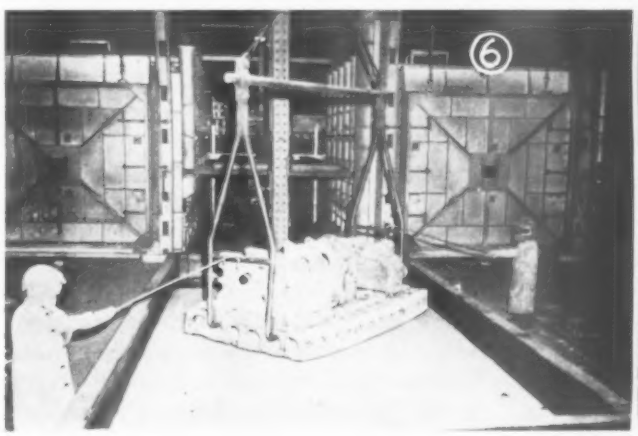
have Minneapolis-Honeywell gas control valves, controlled by Foxboro instuments. The thermocouples are 48 to 60 inches long, so that they reach into the load.

In order to have a check on the mechanical and electrical controls, there are observation ports at various locations in the furnace. The operators are instructed to run the furnace not only with the electrical and mechanical controls, but to observe the actual temperature and, if necessary, make control adjustments. This is very necessary in the case of odd-shaped loads.

Quite a number of different car type furnaces are used, but the average is between 6 to 8 feet from the top of the car to the spring of the arch, with door opening widths of from 7 to 11 feet, and the lengths varying from 17 to 24 feet.

The castings are removed from the car by means of either sling chains or 4-hook or 3-hook cables, depending on the design of the castings being quenched. For the racks of castings, 4-hook or 3-hook cables have been used, but at present a lifting bale is being used which has been a great help in the speed of removing the load from the car and which also has cut down the manpower necessary for the quenching operation.

The car is run out of the furnace by a motor driven pinion in front of the furnace, just a few inches above the floor level, which operates on a (*Please turn to page 256*)



Cupola Raw Materials

In this first installment of the second annual Foundation Lecture of the A.F.A. the author points out the differences between melting of steel and melting of gray iron in the cupola, effect of small amounts of elements, graphite nuclei theory, and effect of humidity.

By H. W. Gillett

Battelle Memorial Institute
Columbus, O.

DR. HORACE W. Gillett, author of the second annual Foundation Lecture of the A.F.A. is well known in the foundry and metallurgical fields. He was born in Steuben county, N. Y., on Dec. 12, 1883, and attended Cornell University, Ithaca, N. Y., where he received an A.B. degree in 1906 and a Ph.D. degree in 1910. For several years he served as manager, Research Department, Aluminum Castings Co., and then joined the Ithaca, N. Y. Field Office, U. S. Bureau of Mines, where he worked on electric furnace melting of brass which led to the initial design of the rocking, indirect-arc type of furnace. Later he was appointed chief, Metallurgical Division, U. S. Bureau of Standards. In 1929 he became director, Battelle Memorial Institute, Columbus, O., when it was formed, but relinquished those duties later to become technical advisor, his present position.

Dr. Gillett has written extensively on a variety of subjects dealing with metallurgy and engineering. He is a member of the War Metallurgy Committee and is author of a committee report presented in abstract form as "Selecting, Evaluating and Specifying Metallic Materials" in the February, March, April and May issues of THE FOUNDRY. *In 1932 Dr. Gillett was awarded the John A. Penton Gold Medal of A.F.A., and in 1939 presented the Howe Memorial Lecture of the American Mining and Metallurgical Engineers. In 1942 he prepared the Edward Williams Lecture for the Institute of British Foundrymen.*

IN LAST year's lecture, John Bolton reviewed the growth of knowledge and the increase in its application throughout the whole foundry industry. He was able to do quite a lot of "pointing with pride."

He listed, in the chain of factors in "maintenance and improvement of the industry," as subdivision "a," "the raw materials used directly and indirectly." Without either "pointing with pride," or "viewing with alarm," let us consider, as today's topic, where the industry stands in respect to knowledge of cupola raw materials, confining the considerations to those for cast iron and cupola malleable, since the Barrett cupola problem, though equally interesting, does not confront many foundrymen.

The cupola is differentiated from other foundry melting media by the small size of its individual charges and taps. Other furnaces that use large charges can mix different lots of raw materials and secure much dilution of impurities that happen to be present in some piece of scrap. With the cupola, this is postponed. Effective mixing can be done only after the metal is tapped. Forehearths mitigate this difficulty only to a limited extent. In contrast, a big heat of steel can be held for analysis and final adjustment of composition. Copper-base and aluminum-base alloys regularly utilize scrap in the shape of secondary ingot, the composition of which has been preadjusted. Cast iron will not stand the cost of premelting and preadjustment.

Another differentiation from other melting methods is the intimate contact of coke and metal. Again, slag is employed in the cupola as a means of disposing of coke ash and of sand adhering to gates, rather than for its protecting and purifying influences on the metal, as in the case of steel.

For these reasons, uniformity of the cupola product properly would require more uniformity in raw materials than is the case with many other foundry products. However, most cupolas do struggle along against distressingly nonuniform raw materials, and the effects of variations in raw materials do tend to carry through to the finished product—the product shows "heredity."

Little is heard about heredity of pig or scrap in steel manufacture these days, in contrast to earlier days when "body" of steel was discussed. Body was the term applied to those individual peculiarities of a heat of steel which gave it desirable hardenability, grain size, etc. These qualities were duplicated in successive heats by sticking to the same raw materials and the same melting practice. The Swedes found this out and capitalized on the quality and uniformity thus obtained. However, as the effect of grain size became appreciated, and use of aluminum, titanium, zirconium, etc., additions after proper oxidation of the batch to control it was developed, grain size effects ceased to be hereditary or mysterious, for they came under control by adjusting details of handling and finishing the heat. The differences in raw material became less apparent and were practically swamped out. The influence of the sulphur content on the necessary aluminum, titanium, or zirconium additions came out a bit later, especially in regard to cast steel. This wiped away a good deal of the remaining mystery.

As interest increased in hardenability, differences appeared between heats of os- (*Please turn to page* 270)

Increasing Gray Iron Production Through Modernization

By EDWARD C. HOENICKE
Gray Iron Castings Section
War Production Board
Washington

Edward C. Hoenicke, assistant to the general manager, Foundry Division, Eaton Mfg. Co., Detroit, is at present loaned to the Gray Iron Castings Section, Forgings and Castings Branch, War Production Board, Washington. Mr. Hoenicke entered the foundry industry in 1916 with the Oliver Machinery Co., Grand Rapids, Mich. After serving with various companies in the Detroit district he left the Oakland Motor Car Co. in 1928 to become sales engineer with the Holley Permanent Mold Machine Co., and when the Eaton-Erb Foundry Co. was organized in 1932 he was made sales manager.

FOR the first time in a great number of years the gray iron foundry industry is in the unique position of having most foundries filled with work to the extent of their capacity as determined by available manpower. This condition would be extremely desirable but for the fact that many more tons of gray iron castings are needed for both the war effort and essential civilian requirements. To complicate the situation, all manpower normally available to foundries is being utilized. This means that the extra tonnage of gray iron castings must be produced by substantially the same number of foundry workers as now are employed. It is well known that there are sufficient basic facilities to produce the desired tonnage—that is, enough cupolas, floor space, equipment, and trained management. Therefore, the problem is to employ these facilities to the greatest advantage.

As a means of producing more casting with available manpower, the following suggestions are offered for consideration. Methods for increasing production may be divided into two main categories. (1) Increased production resulting from better working conditions; (2) increased production because of new and better equipment and proper arrangement of present equipment.

Must Improve Working Conditions

In attempting to create desirable working conditions the foundryman is confronted with problems that are inherent in foundry materials and operations. Due to these conditions the foundry is traditionally associated with dirt and smoke. As a result there has been a lowering of standards of the type of labor in the foundries. This lowering of standards has not been considered serious until other industries made great strides in improving working conditions.

When thinking in terms of sustaining the quality of labor, foundrymen can be under no illusion that the average high school graduate voluntarily will choose the foundry for his life work. If the foundryman has been observant he already has seen the younger and more aggressive employes leave the industry entirely. Present conditions have reached the point where, if the foundry is to meet schedules as well as control casting costs, the quality of foundry labor must be improved, and further, must be supplemented with modernized equipment.

Some foundrymen, seeing the general tendency in other industries to improve working conditions, have already done a great deal along the same line in their own foundries. Better workmanship has been obtained from their present employes, and with certain limitations a higher type of labor has been attracted.

Foundrymen are becoming more conscious of the need for increasing production through rearrangement of present facilities and the addition of new equipment. What they sometimes overlook are the methods for finding the points at which changes should be made to obtain the best results at minimum cost.

The first step in such a program is the development of a general arrangement drawing of the foundry. All present equipment, conveyors, buildings, property lines, sidings, piping and underground work should be clearly indicated on as large a scale as possible. Keys, indications for overhead and underground work, colors, and even three dimensional representations sometimes are found advisable in order that the whole picture may be comprehended easily. It might be pointed out that foundry engineering firms specializing in that type of work have spent much time and thought in devising means for rendering the general arrangement drawing as graphic as possible.

The second step is to have all future plans for expansion and changes indicated on the basic general arrangement drawing. Every foundryman has ideas in his mind for some future consideration.

The third step involves the production of a "flow chart." Simple examples may be shown in which rectangles note operations and lines connecting these rectangles indicate these operations in their proper sequence. Amount of material in pounds and units that is to be moved can be noted in the connecting lines. The energy expended in these moves in even the small- (*Please turn to page* 264)

Questions and Answers

Good Ventilation Conditions Minimize Zinc Fume Trouble

Q.—We are aware of some of the hazards of zinc poisoning, particularly in the mines, but would like to know something about its dangers in brass melting. Can you suggest sources of information?

A.—Zinc oxide smoke or fume does give rise to health disturbances more commonly known as "zinc, spelter, or brass shakes", and medically as "metal fume fever". It often is characterized by severe chills, fever and digestive upset. It is probable that trouble from zinc smoke is not encountered a great deal in the foundry field unless the shop is small or poorly ventilated.

Many state laws limit the concentration of zinc oxide in the shop atmosphere to 15 milligrams per cubic meter of air, but for definite data on that we suggest that you get in touch with your own state labor or health departments. If your state has labor compensation laws, it will have a department to handle such cases, and rulings as to compensable conditions. We also suggest that you obtain a copy of the recently issued, "Code of Recommended Practices for Industrial Housekeeping and Sanitation", prepared by the Industrial Hygiene Codes Committee of the American Foundrymen's Association. That mentions that eating should be prohibited in melting, grinding and polishing departments where lead, zinc, brass, and copper are used. However, no specific mention is made of zinc fumes as such.

Wants To Remove Aluminum From Bronze Used for Valves

Q.—We have received a shipment of ingots to meet Navy M specification 46-B-8g which by analysis shows 0.03 to 0.06 per cent aluminum. It is being used to make globe valves, and since using the ingot we have had considerable trouble with porosity. We think the porosity is due to aluminum, and would like to know if there is any way we can neutralize its effect during melting. We use a proprietary flux.

A.—Your surmise that the aluminum content of the ingot metal is the cause of porosity troubles in the globe valves is right since the general consensus is that presence of aluminum leads to unsoundness. It also is believed that aluminum reduces the strength of red brass, and appears to form thin films which possibly might be the result of a reaction with lead. Those films apparently form, or permit minute passages to form, which result in seepage or leaks.

We understand that copper oxide has been used with success in removing aluminum from brass or bronze through chemical exchange; the copper oxide being reduced to metallic copper, and the aluminum being oxidized to aluminum oxide which forms a scum or slag and rises to the surface. While the practice is hardly recommended for large-scale operation, it might be a temporary relief until new supplies are available.

Procedure is to use about 1½ pounds of copper oxide per 100 pounds of contaminated metal. Melt the alloy to be treated good and hot, and then pour into a hot crucible which contains the proper amount of copper oxide in the bottom. Stir well to promote a good reaction between the oxide and the metal, and skim well before pouring. Generally presence of aluminum can be detected by the silvery sheen which shows on the surface of the ingot or casting, and you can tell by appearance on how successful the aluminum removal has been.

It might be wise to leave out the proprietary flux while trying the oxide experiments to see what results are obtained, and then add it gradually to determine the effect. Some claim that a flux of borax and salt will remove aluminum, but we do not know whether it will work successfully. While such a flux might be all right for an open flame furnace, we believe that it would cause considerable cutting at the slag line in a crucible.

Information Lacking on Detail Of Permanent Mold Process

Q.—We recently started making aluminum alloy aircraft castings in permanent molds, and would like to obtain information on producing molds and castings.

A.—Design of permanent molds appears to be a rather secretive business since little published information is available on the subject. That may be due to the fact that procedure is not an exact science since molds that differ considerably may be employed by different firms in producing the same castings. As a general rule the molds are made of gray iron, either plain or alloy type, and the thickness of mold wall is about three times that of the castings to be made. Since more metal flows through the gate section, it is made considerably heavier than the rest of the mold.

It is essential that the mold be designed so that the casting can be removed easily, and of course, a solid casting must result. Parting lines should leave only slight fins or flash at the most, and usually are located so that the casting appearance is not affected. Parting lines also act as vents, and provide sharp impressions in corners, etc. Hence, in some cases it may be advisable to make the mold in sections not only to facilitate manufacture, but to provide additional vents. The various pieces are assembled and fastened together to permit easier handling.

Contraction allowance for molds for aluminum castings is about 0.10 per cent. Metal must be brought into the mold with the least turbulence, and usually the

gates are curved to provide smooth flow. Gates may open into thick or thin sections, and at the top or bottom. With tall castings having thin walls the gate parallels the casting with a number of entrances at various points, and a riser is located on the opposite side. Size of the gate should be such that it fills the casting rapidly, and freezes shortly after the casting. In many cases it may be advisable to use several gates to eliminate local overheating which decreases mold life through warping and cracking.

As sometimes occurs, the mold thickness may not have the proper relationship to casting thickness, and proper cooling cannot be obtained. In such cases higher cooling rates may be established by use of copper inserts, water cooling passages, or pins or fins on the back which increase the surface area. Conversely, if portions of the mold cool too rapidly, the mold face may be coated with an insulating paint composed of whiting or clay, waterglass (sodium silicate), graphite and water.

Small Surface Holes Caused by Loose Sand in Mold Cavity

Q.—We are sending for your examination several small bronze castings made of the 88-8-4 alloy which forms part of a pressure valve assembly. They are mounted on matchplates with two gates, five pieces to a gate, and with the boss in the cope. They are poured at 2100 degrees Fahr., and come off slaggy at the gate end. We used to gate into the heavy boss but had trouble with sand holes, and changed to gating at the thinner section which resulted in fewer rejections, but still not as low as we think it should. Inspection is quite critical and any pinholes cause rejection.

A.—Examination of the small valve castings submitted to us leads to the opinion that your chief difficulty results from sand particles in the casting cavity which are washed up by the molten metal and lodge on the surface. While some of the trouble may be due to not blowing out the mold cavities previous to closing, it appears to us that much of it may result from the breaking of the edges around the joint as all of the castings show the evidences of that condition. Possibly, the breakage may occur when the pattern is removed, and the loose sand blown out, but there is a good possibility that the breakage may occur in closing the mold. It might be well to watch molding, and open a few molds after they have been closed to see whether some sand particles have dropped into the cavity.

Perhaps your sand is being worked a little too dry, or does not contain quite enough bond to maintain good sharp edges at the joints. Again it might be that your flasks are warped so that they do not rest uniformly on the matchplate with the result that a crush develops when the molds are closed, pinching off the sand at the edges. You mention a slaggy condition at the gates, but we can find no evidence of that since the castings have been blasted. See that the metal is skimmed clean before pouring, and it is suggested that you try a skim core in the down sprue. We cannot understand why you do not pour the castings with the heavy boss in the drag rather than in the cope. Also we believe that gating into the heavy section of the boss will insure that it is solid. Determination of the proper pouring temperature for the castings is something that will have to be done on the job. Our guess from exterior appearance of the castings submitted, is that the temperature is about right for your particular conditions. However, you might try increasing the temperature say, 25, 50 and 75 degrees, and notice the effect. Also you might try reducing it in a similar fashion, but we believe a slight increase will be more favorable than the other way round.

Fly Wheel Poured Through Pop Gates on Top of the Rim

Q.—What is the best type of gate and how many risers should be placed on blank gears and fly wheels weighing from 1 to 3 tons, with 3 to 6-inch rim thickness and 8 to 12-inch face?

A.—Where the mold is made properly the metal enters through a number of small pop gates on top of the rim and fed from a circular runner basin on top of the cope. No riser is needed on the rim, but a generous size riser is placed on the hub, principally to exert pressure and prevent metal from drawing away from the rim. Emphasis is placed on the necessity of providing a strong, firm mold. A weak mold will yield to some extent when the mold is filled with liquid metal. When the wall yields, gravity draws the metal from the top of the casting and the resulting cavity or cavities on the top incorrectly are attributed to shrinkage. On a second attempt the molder is inclined to place large risers on the rim to counteract this apparent shrinkage. The remedy is satisfactory in many instances so far as the appearance of the casting is concerned, but a careful check on the diameter of the wheel will show that it actually is larger than the pattern.

GANGWAY!

By J. A. Patterson

"Yes, Miss Snodgrass, it looks lovely—but couldn't we skip the furniture polish?"

Shows Interest in Oil Sand Cores

Q.—We are interested in securing information regarding oil sand cores suitable for small, medium and large castings. In this section of Australia a good grade of beach sand is available showing a silica content of 95 per cent. We should also like to learn more about the cement bonded sands referred to in recent issues of THE FOUNDRY.

A.—For a complete treatise on the subject of oil and sand cores, and all other types of cores we suggest you secure a copy of *Modern Core Practices and Theories* by H. W. Dietert, and published by the American Foundrymen's Association. The section on oils covers three classes, vegetable, mineral and marine animal; requirements, physical properties, manufacture, specifications, and an extended discussion on methods of testing and effect of varying time and temperature on the tensile strength. Vegetable drying oils are used most commonly, while the mineral oils, which have been processed by polymerization, are coming into favor. Formerly fixed oils of the drying type, for example linseed oil, or semidrying oils, such as corn oil, or marine animal oils were employed to some extent in the foundry. Some foundrymen still use them.

However, manufactured core oils now are universally available. They are produced under laboratory control and balanced to meet certain specific requirements. For general purpose use, the oil is mixed with sand in the proportion of 1 part oil to 40 parts sand and enough water is added to bring the moisture content up to 7 per cent. For special purposes the oil-sand ratio may vary from 1 to 25, to 1 to 80 and the water content from 4 to 10 per cent. In many instances the green strength of the cores is increased by the addition of small amounts of clay or cereal binder.

In the cement mold or Randupson process silica sand is bonded with portland cement in the proportion of 1 part cement to 10 parts sand, and 1 part water to 16 parts sand.

Proper Gating Will Eliminate Holes

Q.—We are making bushings ranging from 8 to 12 inches in diameter, 8 to 12 inches high with 1-inch metal thickness, and are having trouble with holes. We use an oil sand core, and the bushings are cast vertically with a 2-inch sprue leading to the bottom. A heavy riser is used at the top. Directly under the riser the casting is clean, but an inch below on the inside under the riser a staggered group of holes appears, and the deeper you cut, the further they go. Sometimes we also find them on the outside.

A.—No doubt you have investigated the possibility of the core causing blowing, and decided it results from some other condition. Likewise you probably have studied your melting conditions, and concluded that your metal is not being gassed during that operation. Consequently it appears that the trouble arises in the location of gates and risers and their size. While you have a heavy riser at the top, you feed in the hot metal at the bottom with the result that the riser contains cold metal instead of hot, and proper feeding is impossible.

One satisfactory method of correcting such trouble is to connect the gate at the bottom of the bushing with the

bottom of the riser through a vertical sprue. That will cause the hot metal to flow into the riser after the casting cavity is filled. Such a sprue does not have to be more than 1-inch in diameter. Another procedure to insure quiet flow of hot metal around your large bushings is to split the gate into several branches where it enters the cavity. That causes the metal to flow in two or more directions around the core, meeting at a point opposite. Such arrangement does not necessarily mean that the hottest metal will flow into the riser which is the ideal condition unless a suitable connection is made between the riser and the last metal to enter the mold.

Many foundrymen prefer to make bushings on their sides, gating them at one end at the parting line with an ample riser where the gate enters the casting cavity. Metal entering the sprue is led into the riser by a choke gate, and from the riser into the casting cavity with a good sized gate. Hence, the last metal to enter is in the riser and insures good feeding of the casting through a large gate. Usually molds with that arrangement are set on an incline so that the riser is higher than the castings.

Still another arrangement that is favored by some foundrymen in casting bushings on end is to extend the height several inches more than the finished length, and cut off that portion which will contain any gas bubbles and other imperfections. However, such an extension may not act as a riser unless its section thickness is much greater than that of the casting. If the thickness is not increased, a riser will have to be attached. Bushings with uniform wall thickness also may be poured through pop gates; this involves a circular pouring basin containing a ring of holes equidistantly spaced in relation to each other, and to the walls of the casting cavity. Sometimes those are arranged so that through use of a stopper the basin is filled with metal. Then the stopper is removed permitting the metal to flow through the pop gates below. Any slag or dross floats on top of the metal allowing only clean metal to enter the mold cavity.

Binder Bars Clamp Mold in a Pit

Q.—What method or methods is or are employed to bind or clamp large molds rammed up in pits in the floor of the foundry?

A.—Assuming that the lower part of the mold is constructed and reinforced properly to prevent the walls from yielding when the mold is filled with metal, the foundryman's problem resolves itself merely into providing a means for preventing the cope from lifting when the metal is forced up against it by pressure from the gates and risers. Contrary to an old fashioned belief that has not died out entirely, the depth or total weight of a casting are not factors in the problem, which simply is one of displacement. To find the pressure exerted against the cope, the area in contact with the cope is multiplied by the height of the riser. The result is multiplied by 0.26-pound, the weight of a cubic inch of iron. For example the cope area of the casting is 20 x 40 inches and the height of the sprue or riser is 10 inches. The weight required to hold the cope in place is 20 x 40 x 10 x 0.26 = 2080 pounds. The weight of the cope is included, but usually that is ignored and regarded as a safety factor.

In some instances the weights are placed directly on the cope, provided the cope is resting on solid supports. The safer practice, and one that is mandatory where the cope is resting on sand, is to place rails or binder bars a short distance above the cope with the ends resting on suitable supports on the floor in the vicinity. The weights are placed on the bars and then wedges are driven between the bars and the upper flanges of the flask. In a second method a rigid cast iron plate is placed in the bottom of the pit and the mold is built upon this plate. Suitable bolts extend from lugs on the plate to a point above the floor level. When the mold finally is closed, long binder bars or rails are laid across the cope as in the first instance and nuts and washers are tightened down on the bolts. In a variation of this method, binder bars are placed under a single plate or a number of plates in the bottom of the pit. In a third method, where a concrete wall pit is available, permanent loops or stirrups are incorporated in the walls to serve as anchors for hook bolts extending downward from the binder bars.

ON THE MARCH
to aid Foundrymen...

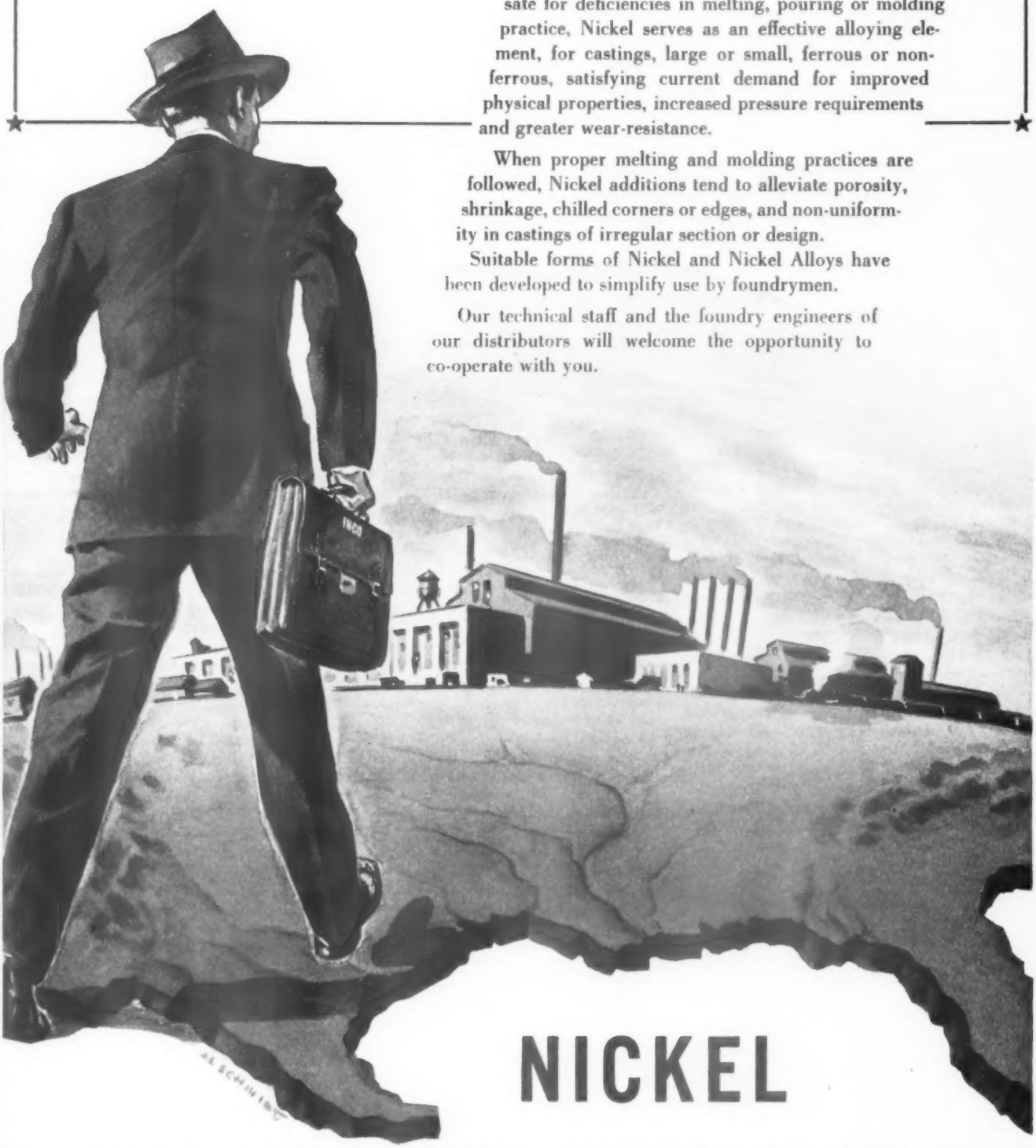
NICKEL FIELD REPRESENTATIVES are always "on the go." By reason of training and experience they are equipped to offer timely assistance on foundry problems.

While not a "cure-all" in that it will not compensate for deficiencies in melting, pouring or molding practice, Nickel serves as an effective alloying element, for castings, large or small, ferrous or non-ferrous, satisfying current demand for improved physical properties, increased pressure requirements and greater wear-resistance.

When proper melting and molding practices are followed, Nickel additions tend to alleviate porosity, shrinkage, chilled corners or edges, and non-uniformity in castings of irregular section or design.

Suitable forms of Nickel and Nickel Alloys have been developed to simplify use by foundrymen.

Our technical staff and the foundry engineers of our distributors will welcome the opportunity to co-operate with you.



NICKEL

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

Investment Is Name For Mold Material

Q.—Can you give us some information concerning the investment molding process, and whether it can be applied to aluminum founding? Also we would like to know something about a vacuum type mold.

A.—Investment molding process received its name from the dental profession which terms the molding medium for casting inlays, etc., whether it be plaster or some other material, an investment. Incorporation of the term investment molding in the foundry vocabulary comes from the fact that many dental firms now are engaged in producing high temperature resistant castings such as turbo-supercharger blades, and other types of castings which must be produced with extremely close tolerances on dimensions — a procedure with which they have had long experience. Both the static and centrifugal processes are used for the castings. Some of the alloys used, especially those for high temperature work, are poured at high temperature, and require special refractory mold materials or investments. Brass castings also are made by the procedure, but in those cases the investment may be plaster of paris.

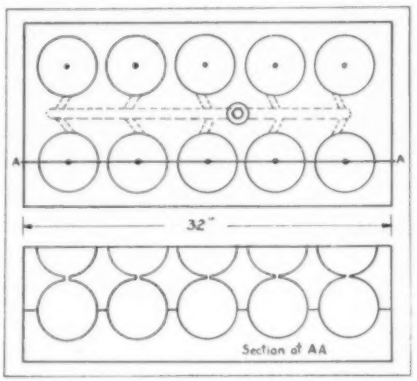
The investment process can be used for making aluminum alloy castings, and plaster of paris is the molding medium. However, since the use of plaster differs considerably from that of sand practice, you will have to do some experimenting to attain the desired results. For more detailed information on the investment molding and plaster molding processes, we suggest that you study "Precision Castings" by L. L. Wyman and D. Basch which appeared in the February issue, and "Casting in Plaster Molds", by Fred Chambers in THE FOUNDRY for March.

A number of patents have been granted on pouring molds under a vacuum, and as might be expected the mold and molten metal container are in the same chamber which can be evacuated. Most recent development is use of the high frequency induction furnace in the chamber with the mold. In one type both mold and furnace tilt while in the other, the mold remains stationary and only the furnace tilts.

Hard Metal Is Cast In Chill Molds

Q.—We are making 4 and 5-inch diameter hard iron grinding balls from metal melted in a 500-pound capacity electric furnace. The metal is poured into permanent cast iron split molds set up about 30 in a row. The pouring opening is 2¼-inches in diameter. We leave a small flat spot on top so the center of the ball has something to draw from. About 30 per cent come out with a deep shrink hole on top. The hot castings are removed and transferred to a heat treating furnace and then quenched. We are installing a 30-ton hydraulic press for compressing the castings after they leave the molds. The metal charge includes all the miscellaneous iron and steel scrap we can secure in this district. We shall appreciate any information on how to eliminate the shrinkage defect, or on a better method for producing these castings.

A.—Hard metal balls employed in ball mills for pulverizing ore and other materials are cast in permanent molds and also in sand molds. Adoption of either method usually depends on the volume of castings required. Satisfactory castings are made by both methods. The usual number of castings in a mold, sand or iron, is 10 to 12. From your reference to a 500-pound furnace and



Arrangement for producing hard iron grinding balls

molds 30 in a row, we get the impression that the castings are poured one at a time in single molds. This impression is further strengthened by the statement that the "opening of the mold for pouring" is 2¼-inches in diameter, presumably on top. To put it another way, the mold is an enlarged edition of the old fashioned hinged iron mold used for casting lead bullets.

If we are correct in this interpretation, the molds are improperly designed. You have the alternative of constructing a new set of molds containing a feeding chamber above the ball, or of closing the present 2¼-inch opening with a dry sand core with a ¼ or ⅜-inch hole in the center and of course, flared at the top for a sprue opening. Metal poured slowly through this type of gate in a chill mold will congeal rapidly and eliminate the shrinkage defect on the top. As an added precaution the molds may be turned upside down almost immediately after they are filled and while most of the ball is still in the molten condition. This was the technique practiced by the old time cannon ball makers. Individual molds were clamped and suspended on horizontal trunnions. Metal in the small gate and in the bottom of the mold solidified about the same time. Then the mold was inverted. Any subsequent shrinkage developed on the inside where it did not injure the casting.

For the comparatively limited tonnage of castings available from a 500-pound capacity furnace, it might be worth your while to investigate the green sand molding process for these castings. The most serious disadvantage of the method is the relatively large amount of metal required to fill the feeding basin. A 4-inch ball weighs 8.73 pounds and a suitable half spherical feeding head will weigh at least half as much. Thus a green sand mold in a 16 x 32-inch flask, 6-inch cope and drag, would require approximately 142 pounds of metal to pour 10 castings weighing a total of 87 pounds. However, all the castings will be perfect and the feeding heads form part of the next furnace charge. They are not lost or wasted. The patterns may be loose, or mounted on a board or matchplate, five in a row, with a runner between two rows and a small gate leading into each mold cavity at the joint line. The special half spherical feeding head on top of each is connected to the ball mold cavity through a ¾-inch opening, preferably formed in a small dry sand core. The riser formed in this manner is readily broken from the casting. The general idea is illustrated at the left.

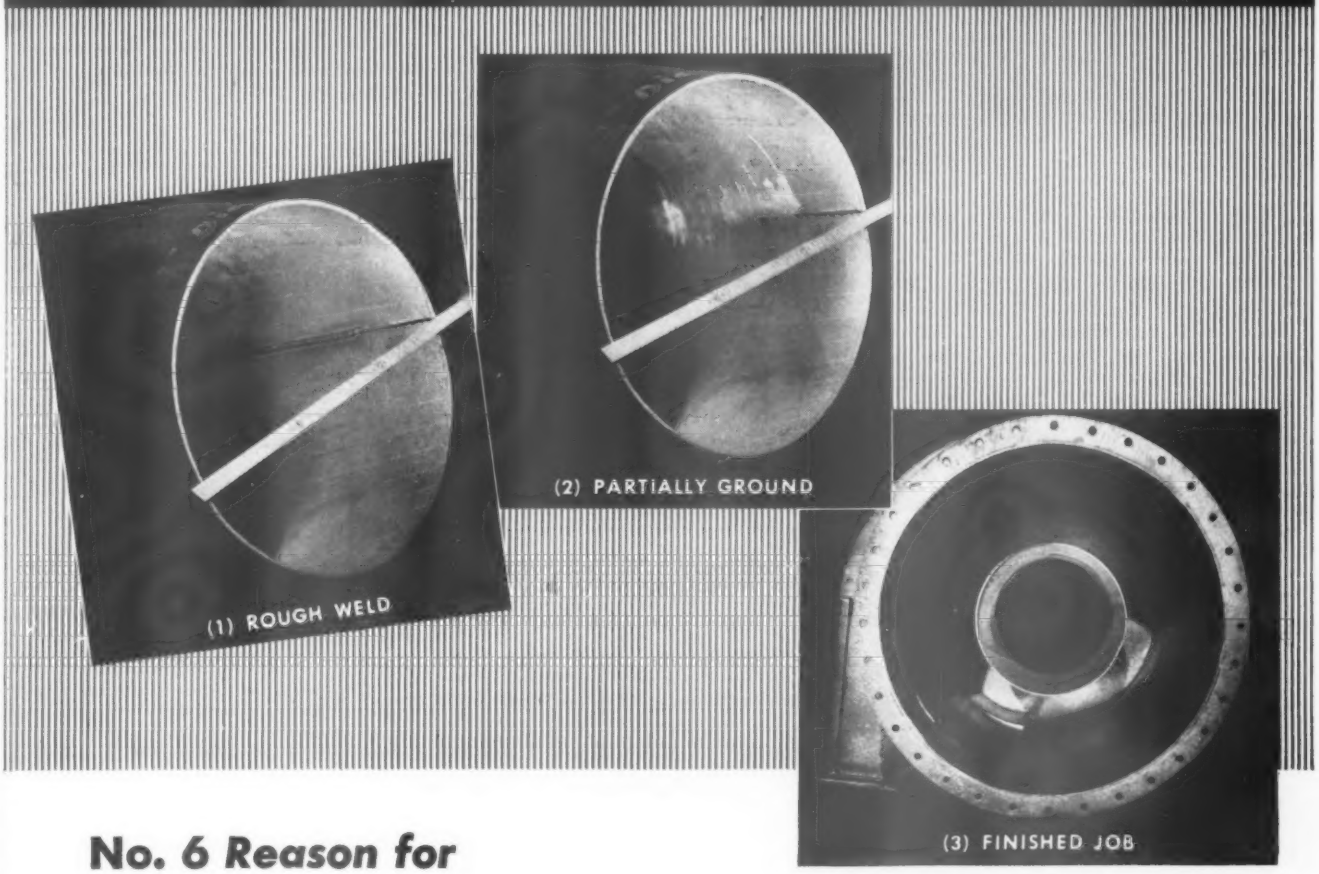
Castings May Warp While Cooling

Q.—Is there any rule or principle by which a person can determine in advance whether a casting will warp or not; whether the ends will spring up or down; and the exact amount of camber needed on a pattern to produce a straight casting?

A.—So far as our experience goes the foundryman or patternmaker has nothing to guide him but a species of sixth sense or intuition developed through many years of close observation and study an experienced foundryman can look at a pattern and estimate pretty closely whether or not the casting will warp, to what extent and in what direction. We do not think there is a definite answer to the warping problem. Anything is possible even if it is not probable. This is illustrated by certain instances in which a casting warped in one direction one day, and in the opposite direction the following day.

The direct cause of warpage is the rate of speed at which various parts of the casting cool and contract. In some instances this is due to the presence of thick and thin sections. In other instances where the casting has uniform section, it will warp if one side or one part is stripped before the other side or other parts. Familiar examples are open sand plates and long grate bars molded on edge 3 or 4 in a flask. Unless the open sand plate is covered with sand, the upper side will cool first and the consequent contraction pull, will cause the ends to spring up. It the drag flask is removed from the grate bars and the sand falls away from the outside, the two outer bars will spring outward at the ends. The two in the center surrounded by hot sand will remain straight. Precautionary measures to prevent warpage include use of chills, hard and soft ramming over certain parts, method of gating, method of stripping, and—usually the last resort—cambering of the pattern.

Next to Split-Duct Manifolds . . . INNER WELDS GROUND SMOOTH



No. 6 Reason for
Buell's High Efficiency, Low Maintenance, Long Life

• THE PROPER FINISHING of the inner surface of all welds in Buell (van Tongeren) Cyclones has a direct bearing upon first, their operating efficiency, second, their length of life.

Any projection in a gas stream will affect the efficiency of a dust collector. Surface irregularities create undue turbulence and cause the reentrainment in the gas stream of previously separated dust particles. Moreover, if the weld-bead is not ground smooth, rapid erosion of the surface beyond the bead will take place, due to the formation of a local eddy current at this point. And continued erosion will shorten the life of the stoutest dust collector.

Smoothly ground inner welds are one more reason for Buell's high efficiency, long life, trouble-free operation, and low maintenance cost. Reasons supported by the wide use of Buell Dust Recovery Systems throughout industry.

Write for a copy of the illustrated book—"The van Tongeren System of Industrial Dust Recovery," containing facts about this patented system, interesting alike to engineer and executive.

BUELL ENGINEERING COMPANY, INC.
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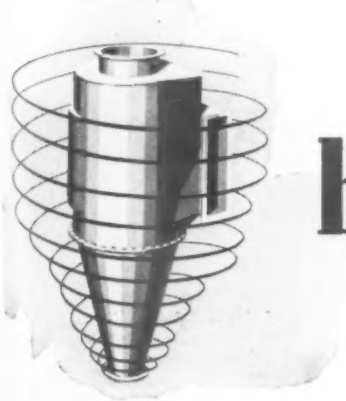
Sales Representatives in Principal Cities



buell
DUST RECOVERY SYSTEMS

BUELL FEATURES	RESULT IN	PRODUCE
SHAVE-OFF LARGE DIAMETERS	HIGH COLLECTION EFFICIENCY	GREATER RECOVERY
EXTRA-THICK METAL LARGE OUTLETS	LESS FAN BLADE WEAR	LOW MAINTENANCE
INNER WELDS GROUND SMOOTH	LOW DRAFT LOSS	LOW OPERATING COST
CORRECTLY DESIGNED HOPPERS	LOW POWER CONSUMPTION	LONG LIFE
SPLIT-DUCT MANIFOLDS	HIGH TEMPERATURE RESISTANCE	NO CLOGGING
	UNLIMITED CAPACITY	
	NO MOVING PARTS	
	FREE DUST FLOW	

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

MEN ... of Industry

WILLIAM KERBER has resigned as deputy assistant director of the Steel Division, WPB, and chief of the WPB Raw Materials and Plant Facilities Division, to rejoin Hanna Furnace Corp., Buffalo. Before going to Washington in August, 1941, Mr. Kerber was eastern district sales manager for the Hanna Furnace Corp.

♦ ♦ ♦

V. D. Sweeney has been appointed sales manager of the National Smelting Co., Cleveland. He has been associated with the company since 1936 in production and sales work. Other recent additions to the sales staff of National Smelting are **James F. Donnelly Jr.** as eastern representative and **A. C. Hamilton** as Michigan representative.

♦ ♦ ♦

Benjamin H. Bartells, who has served during the past year as chairman of the Philadelphia Chapter of the American Foundrymen's Association, is in charge of foundry instruction for engineering students at the University of Pennsylvania, Philadelphia. Mr. Bartells has been identified with the foundry industry since being graduated from Pennsylvania State College in 1925, first as metallurgist, Reading Steel Casting Co., and then with Florence Pipe Foundry & Machine Co. Since joining the University of Pennsylvania he has carried on considerable experimental and development work in sand and high test cast iron.

♦ ♦ ♦

Fred H. Haggerson, recently vice president of the Union Carbide & Carbon Corp., New York, has been elected president, succeeding **Benjamin O'Shea,** who had been president since 1941 and who becomes chairman of the board. Mr. Haggerson has been associated with the company for 25 years.

♦ ♦ ♦

Charles D. Steinmeier recently was made superintendent of foundries, A. D. Cook Inc., Lawrenceburg, Ind. Mr. Steinmeier was graduated from Winona Technical Institute, Winona, Ind., in 1908. He took a post graduate course while with Allis-Chalmers Mfg. Co. and then returned to Winona as an instructor in foundry practice. Two years later he was appointed superintendent of foundries of the Nordyke-Marmon Co., Indianapolis, where he remained until 1924 when he became associated with the American Foundry Equipment Co. as sales engineer. Later he was appointed plant manager of that organization's York, Pa., plant and then transferred to the Mishawaka plant as assistant works manager. In 1932 he became associated with the American Foundry Co., Indianapolis, as superintendent of the core division and remained there until joining A. B. Cook Inc. Mr. Steinmeier succeeds Hubert Smith who is returning to his home in California.

♦ ♦ ♦

Lewis A. Dibble, president, Eastern Malleable Iron Co., Naugatuck, Conn., has been appointed head of the new "government spending" committee of the National Association of Manufacturers, New York, which will seek to slash waste and nonessential spending in government. Mr. Dibble is a member of two War Production Board advisory committees and is a past president of the Malleable Founders Society.

♦ ♦ ♦

John C. Vander Pyl, for the past 4 years vice president and operating officer at the East Moline, Ill., plant of American Machine & Metals Inc., has been named executive vice president. **Wayne Mendell,** since 1940 general sales manager, has been appointed vice president in charge of sales.

♦ ♦ ♦

W. Herschell Skinner has been appointed assistant purchasing agent of the Perfect Circle Co., Hagerstown, Ind., and **Robert Van Winkle** has succeeded Mr. Skinner as purchasing agent of the company's Richmond, Ind., plant.

♦ ♦ ♦

M. F. Dunne, president, Pyott Foundry & Machine Co., Chicago, has been appointed chairman of a newly created committee of the Illinois Manufacturers' Association to formulate plans for reemployment of war veterans.

♦ ♦ ♦

Sidney J. Newman, president of Newman Bros. Inc., Cincinnati, was re-elected president of the National Association of Ornamental Metal Manufacturers for the seventh consecutive year at the association's meeting held in New York, May 4-5.

♦ ♦ ♦

Norman F. Smith, vice president and general manager of the Osborn Mfg. Co., Cleveland, has been re-elected president of the American Brush Manufacturers' Association.

♦ ♦ ♦

Harold A. Anderson has been appointed eastern district manager of the Aus-

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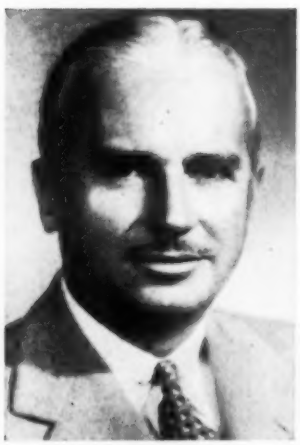

WILLIAM KERBER

V. D. SWEENEY

BENJAMIN H. BARTELLS

FRED H. HAGGERSON

Year-in, Year-out
You Can Rely on
the Uniform Dependability of WOODWARD IRON

PRACTICAL foundrymen know that the *best* assurance of *consistent* uniformity in merchant iron is a source of supply that uses *uniform* raw materials from month to month and year to year.

Woodward Iron Company is the only exclusive independent merchant iron producer in America that owns, controls and operates its own sources of supply. That's why Woodward is always able to obtain its base burden from the same vein of iron and coal—the famous Red Mountain ore and Pratt seam of coal. Reserves of ore and coal are adequate to operate Woodward furnaces at peak capacity for fully 100 years.

Operating as an independent company making only pig iron, Woodward is able to maintain control of analysis within exceptionally narrow limits.

Woodward invites inquiries from foundries seeking a dependable and ample *year-in, year-out* source of supply of uniform merchant iron.

WOODWARD IRON COMPANY

Woodward, Alabama

Independent Since 1883

(*Continued from page* 140)

tin Co., Cleveland, succeeding J. K. Gannett, vice president, who recently was appointed director of engineering.

♦ ♦ ♦

Frank M. Blum has been appointed manager of the Crane Sales Division, the Harnischfeger Corp., Milwaukee. He succeeds **Ben Van Horn** whose retirement was announced recently. Mr. Blum joined the company in 1929 following an association with Cutler-Hammer Inc. for seven years. He had been assistant manager of the division since 1938.

♦ ♦ ♦

John Avery has been appointed manager of the blower and compressor department of Allis-Chalmers Mfg. Co., Milwaukee, succeeding **G. L. Kollberg,** who has retired after 47 years of service with the company. Mr. Avery had been assistant manager of the department since 1935, and has been associated with Allis-Chalmers since 1931. Mr. Kollberg, who in 1897 joined the Fraser & Chalmers Co., an Allis-Chalmers predecessor, will continue with the company as a consultant.

♦ ♦ ♦

Arthur J. Miller has been elected president of the Chicago Wheel & Mfg. Co., Chicago, succeeding his father, the late Henry E. Miller, who founded the company in 1894. Mr. Miller joined the special formula department of the company in 1915, and in 1926 he was elected treasurer. He is responsible for the development of numerous abrasive products and processes.

♦ ♦ ♦

John B. DeWolf has been appointed vice president in charge of sales for Woodward Iron Co., Woodward, Ala., with headquarters at newly opened general sales offices in the First National building, Birmingham. He will have direct charge of sales in ten southern states and maintain general supervision over the company's national sales program. A native of Rhode Island, Mr. DeWolf has been active in the iron and steel business since 1918. For approximately 18 years he was associated with the Trumbull Steel Co., Warren, O., now part of Republic Steel Corp., as Philadelphia district sales manager. For the past 5 years he has been district sales manager for Jones & Laughlin Steel Corp., with offices in Philadelphia, New York and Washington.

♦ ♦ ♦

J. W. Dietz, industrial relations manager of the Western Electric Co.'s manufacturing department, who at present is on leave for service with the government, has been awarded an honorary degree of doctor of engineering by Purdue University, from which he was graduated in 1902.

♦ ♦ ♦

J. A. Drain Jr. has been elected vice president in charge of product engineering, research and development for the Sullivan Machinery Co., Michigan City, Ind. Formerly he was assistant to the president. **O. J. Neslage,** recently general sales manager, has been elected vice president in charge of sales in the United States and Mexico.

♦ ♦ ♦

Albert P. Leonard has been appointed manager of the New York office of the Farrel-Birmingham Co. Inc., Ansonia, Conn., and Buffalo. He succeeds **Edward S. Coe Jr.,** who has been transferred to the main office at Ansonia as assistant to the plant manager.

♦ ♦ ♦

Quincy M. Crater has been appointed assistant manager of the Detroit office territory of Westinghouse Electric & Mfg. Co. Associated with the company since 1927, Mr. Crater recently was manager of the petroleum and chemical section.

♦ ♦ ♦

Herbert A. White has joined the Smeeth-Harwood Co., Chicago, as manager. Mr. White had been Pittsburgh district sales manager for the National Bearing Metals Corp. since 1927.

♦ ♦ ♦

W. H. Henson has been appointed refractories field engineer by Norton Co., Worcester, Mass., with headquarters in that city. Mr. Henson has been with the company for 16 years, the past 13 years as refractories engineer for the New England district. He has been succeeded in the latter capacity by **Eugene A. Fischer,** recently connected with the research laboratories and refractories engineering department at Worcester.

♦ ♦ ♦

R. A. Neal, manager of the Switchgear Division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been elected a vice president of the company. Other newly elected vice presidents include **J. K. B. Hare,** formerly manager of central district sales; **John H. Ashbaugh,** recently manager of the Electric Appliance Division, and **H. H. Rogge,** formerly manager of the Washington office.

♦ ♦ ♦

Maurice N. Trainer, first vice president, American Brake Shoe Co., New York, has been elected a director. Vice president of the company since 1933, he was made first vice president last October. He has been president of the Brake Shoe and Castings Division of the company since 1939.

♦ ♦ ♦

O. J. Leone has been appointed Pittsburgh regional manager of the steel mill division for the Bristol Co., Waterbury, Conn. Associated with the Carnegie-Illinois Steel Corp. for 8 years, Mr. Leone joined the Bristol Co. at Pittsburgh in 1937 as sales engineer.

♦ ♦ ♦

Dr. John Fairfield Thompson, executive vice president of the International Nickel Co., has been awarded the 1944

(*Concluded on page* 144)

FRANK M. BLUM

JOHN AVERY

ARTHUR J. MILLER

JOHN B. DeWOLF

THE LAST DROP IS AS GOOD AS THE FIRST

Ask the Men Who Use It!

"Nearly Right" Won't Do!

To lose by a nose—is to lose the race! And a flaw in a casting means complete waste! The UNIFORM QUALITY of Dayton Core Oils is an important factor with foundries which must produce flawless castings . . . and that means all foundries. Are you using these better oils in your core room? Ask the Dayton Oil service man.

The

DAYTON OIL COMPANY

DAYTON • OHIO

STEEL CORE AND MOLD WASHES • BINDER AND CORE PASTE • CORE WASHES • CHILL COATINGS

(*Concluded from page* 142)

Egleston Medal of the Columbia University Engineering Schools Alumni Association for distinguished engineering achievement.

♦ ♦ ♦

Ray H. Moore, representative of the National Engineering Co., Chicago, in northern Ohio for the past 10 years, has been appointed district manager of that organization with headquarters in Cleveland. His activities will center largely in Ohio, western New York and western Pennsylvania. Mr. Moore has had wide experience in the sale and servicing of materials handling, sand preparing and melting equipment.

Fred W. Fuller, connected with the National Engineering Co. for over 7 years, will handle sales and service of mixers throughout Ohio, as field engineer with headquarters in Columbus. Mr. Fuller has specialized in sand conditioning and sand control problems.

William E. Jones has been made field engineer in eastern Pennsylvania, Maryland and southern New Jersey for the National company. Mr. Jones formerly was in charge of core and molding operations at the Dodge Chicago Plant division of the Chrysler Corp., and previous to that was connected with the Pontiac Motor Co. and with the Campbell, Wyant & Cannon Foundry Co.

♦ ♦ ♦

Gilbert Shaw Scott is retiring June 30 as secretary of the Institute of Metals (British), an office which he has held since the institute's foundation in 1908. Born in 1884, Mr. Scott was the first student to take the bachelor of science degree in metallurgy at the University of Birmingham. He also was awarded the Bowen Research Scholarship in Metallurgy, and in 1907 received the master of science degree. After a year spent visiting metallurgical plants in America and Europe he was appointed secretary and editor of the newly-formed Institute of Metals in 1908. Mr. Scott played an important part in the organization's growth from an original essentially British membership of 250 to a world-wide total of over 2500 today.

♦ ♦ ♦

Leonard Larsen has joined the staff of the American Foundrymen's Association at the Chicago office as a staff assistant. Mr. Larsen, a native of Marinette, Wis., received his early education in the Marinette High School, and a B.A. degree in commerce from Carroll College,

LEONARD LARSEN

Waukesha, Wis., in 1928. He first became connected with the foundry industry with Grede Foundries Inc., at Waukesha, Wis., as cupola foreman, remaining there until 1937, when he joined Fairbanks, Morse & Co. as foundry supervisor. In 1943, he went with the Pettibone Mulliken Co., in Chicago as centrifugal casting foreman. Mr. Larsen has been a diligent member of the A.F.A. since 1935, when he was a charter member of the Wisconsin Chapter, and later was associated with the Northern Illinois-Southern Wisconsin Chapter.

♦ ♦ ♦

J. B. O'Connor, director, Dresser Mfg. Co., Bradford, Pa., has been elected executive vice president. Mr. O'Connor is vice president and general sales manager of Clark Bros., Olean, N. Y.; chairman of Pacific Pump Works, Huntington Park, Calif., and president of Bovaird & Seyfang Mfg. Co., Bradford, all subsidiaries of Dresser Mfg. Co. **Arthur R. Weis,** president of Pacific Pump Works, has been elected a vice president of the parent company, and **Lyle C. Harvey** also has been elected a vice president of Dresser Mfg. Co.

♦ ♦ ♦

Otto W. Winter has been appointed vice president of the Acme Pattern & Machine Co., Buffalo. Widely experienced in the metalworking field, Mr. Winter is a former president of the American Society of Tool Engineers and currently is national chairman of that organization's education and training committee.

♦ ♦ ♦

F. W. Lee has been appointed field engineer in the Philadelphia district by Norton Co., Worcester, Mass. He succeeds **A. W. McCune** who has left to join the U. S. Navy. Mr. Lee previously was with the research laboratories and engineering service department at Worcester.

♦ ♦ ♦

Harry E. Smith, general manager of the Manhattan Rubber Mfg. Division, Passaic, N. J., and **Robert B. Davis,** general manager of the Raybestos Division, Stratford, Conn., have been elected vice presidents of Raybestos-Manhattan Inc., the parent company.

♦ ♦ ♦

Edward N. Haas has been appointed works manager of the Aurora, Ill., plant of the Independent Pneumatic Tool Co., succeeding **W. H. Brewer,** who has been named general factory manager. **John P. Bank** succeeds Mr. Haas as assistant works manager.

♦ ♦ ♦

E. S. Weidle has been appointed vice president in charge of sales of the Pittsburgh Steel Foundry Corp., Glassport, Pa. Mr. Weidle formerly was general manager of sales. **Walter White,** recently plant manager, has been appointed vice president in charge of production.

WILLIAM E. JONES

FRED W. FULLER

RAY H. MOORE

STERLING

THE WHEELS OF INDUSTRY

A Close Shave For The *Enemies of Democracy*

FORMING the recesses of "The Wheels of Industry" is just another painstaking job that must be accurately done to provide grinding wheels of the quality needed to speed wartime production. Our Shaving Department is dedicated to the job of trimming the Axis, and getting our country back into peacetime production as soon as possible.

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THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

INDUSTRY ...Briefs

PRODUCTION of magnesium castings has expanded further this year to an all-time high, according to WPB reports. Latest available data, that for February, shows shipments of 3301 tons of sand castings, compared with 3105 tons in January. Deliveries of permanent mold castings dropped from 268 tons in January to 235 in February, with die casting shipments off from 119 tons in January to 110 in February.

• • •

Recent awards by the U. S. Maritime Commission include the "M" to the Washington Stove Works, Everett, Wash., and gold stars to the following who previously had received the "M" pennant: Columbia Steel Castings Co., Portland, Oreg.; Cramp Brass & Iron Foundries Division, Eddystone, Pa.; Foran Foundry & Mfg. Co., Flemington, N. J.; Penn Steel Castings Co., Chester, Pa.; Pottsville Casting & Machine Shops Inc., Pottsville, Pa., and Warman Steel Castings Co. Ltd., Los Angeles.

• • •

McNally-Pittsburg Mfg. Corp., Pittsburg, Kans., has purchased 8 acres of land a few blocks from its main plant and will erect a new gray iron foundry with a capacity of about 25 tons per day. The building will be approximately 106 x 210 feet and will have a capacity for castings weighing up to 15 tons. The foundry will be completely mechanized with new sand handling and conditioning equipment, new molding machines and core making machines. The organization has been licensed by Sorbo-Mat Process engineers. Thomas McNally is president.

• • •

Symington-Gould Corp., Rochester, N. Y., has ceased operations at one of its three plants there. The foundry, a Defense Plant Corp. project, was built about 18 months ago. Various factors were responsible for the suspension, including inability to obtain sufficient manpower to permit efficient operations, according to the company.

• • •

National Bearing Metals Corp., St. Louis, has let contract for a one-story 20 x 51-foot addition to cost about $40,000 with equipment.

• • •

Eastern Malleable Iron Co., Naugatuck, Conn., plans construction of a one-story 80 x 160-foot addition to cost an estimated $50,000.

• • •

Campbell-Wyant & Cannon Foundry Co., Muskegon, Mich., has been authorized by the Defense Plant Corp. to purchase $665,000 worth of additional equipment at its plant there, making the overall DPC commitment $2,100,000.

• • •

Lewiston Foundry & Machine Works, recently incorporated by George Wilkins and associates to operate a new plant at 1815 Carson Avenue, Lewiston, Idaho, has purchased the equipment of the Clearwater Foundry & Machine Works, that city.

• • •

Erie Foundry Co., Erie, Pa., plans construction of a two-story shop and office building to cost about $60,000.

• • •

American Radiator & Standard Sanitary Corp. now is producing magnesium castings for aircraft at its Litchfield, Ill., plant. The foundry was converted from production of gray iron castings.

• • •

Ohio Steel Foundry Co., Lima, O., is operating its new $3,000,000 South Plant after an idleness of more than a year after the plant was built. Various types of steel castings for war purposes are being made.

• • •

Waite Mfg. Division, Picker X-Ray Corp., Cleveland, has won for the third time the Army-Navy "E" production award for its manufacture of army field x-ray units.

• • •

Doak Aircraft Co., 2321 Abalone street, Torrance, Calif., plans construction of a 30 x 30-foot foundry building to cost $9000.

• • •

Construction Machinery Co., Waterloo, Iowa, has been awarded the Army-Navy "E" for excellence in production of war materials. Presentation ceremonies took place May 10.

• • •

Magnesium Casting Co., Maywood, Los Angeles, is making repairs to its plant recently damaged by fire. The work will cost about $12,000.

• • •

Montague Castings Co., Muskegon, Mich., has completed an addition to its plant for the increased production of gray iron castings.

• • •

R. H. Osbrink Mfg. Co., 6917 McKinley avenue, Los Angeles, is building a 40 x 76-foot addition to its foundry to cost $4000.

• • •

D & M Machine Works, 2304 Abalone avenue, Torrance, Calif., plans construction of a new foundry building to cover an area of 45 x 130 feet and to cost $7000.

• • •

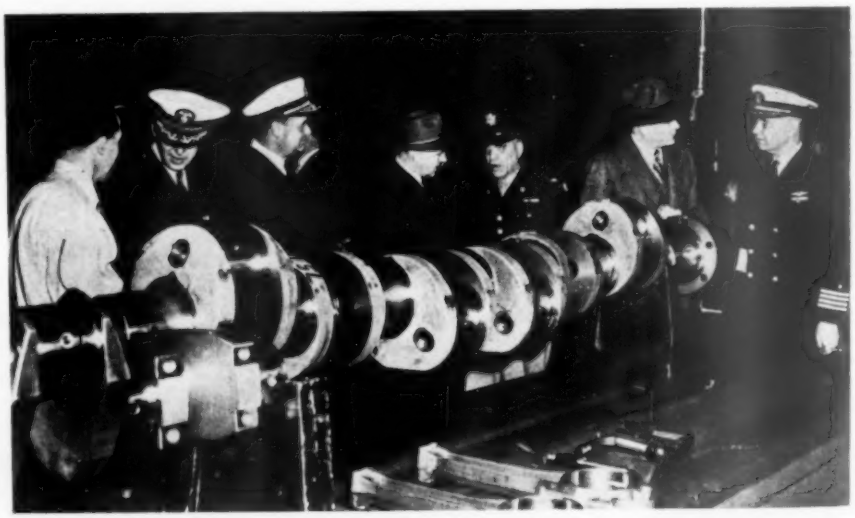
Lincoln Foundry Co., Merrill, Wis., has been purchased by P. J. Stoesser Jr. and Robert E. Stoesser. The new owners started operations May 15, specializing in jobbing work in production of gray iron and brass castings.

• • •

National Cast Iron Pipe Division of James B. Clow & Sons, Tarrant, Ala., has been awarded the Army-Navy "E" for excellence in production of war material.

• • •

Aeroloy Co., Belleville, Ill., plans erection of an aluminum and magnesium foundry at 4480 Hunt Avenue, that city.



COOPER-BESSEMER RECEIVES "E": Group of Army, Navy and company officials examine cast meehanite crankshaft made by the Cooper-Bessemer Corp. of Grove City, Pa., and Mt. Vernon, O. Occasion was the presentation of the Army-Navy "E" to the company for outstanding production of diesel engines. Left to right: Rear Adm. P. B. Eaton; Rear Adm. T. B. Richey; Stanley Johnson, Cooper-Bessemer sales manager; Col. M. A. McFadden; Gordon Lefebvre, Cooper-Bessemer president, and Capt. L. F. Small

Save Casting time UP TO 50%

"Faster in all 3 Departments!"

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Truline cores ram quickly, giving dense cores with freedom from sagging. *This means more cores per hour per core maker!*

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Truline cores harden under low oven heat, dry without oxidation. Oven-time is less, output greater!

3 GET FASTER CLEANING!

Truline cores burn out readily. Core sand shakes out easily, saving valuable clean-up time.

IT'S A LOT OF SATISFACTION to turn out a big order of castings . . . every last one of them true to core dimensions, sound as a dollar! And it's mighty pleasant, too, to have them out on time . . . that certainly rings the bell with the Army, the Navy—whomever you're doing work for! Specify Truline Binder and watch your production climb! The coupon below brings complete information, use it today.

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around DETROIT

BY A. H. ALLEN
Detroit Editor,
The Foundry

Michigan Steel Casting Co. establishes "Supercast" division for production of investment castings. . . . Lower cost and better product compared with steel sand castings said to result from process on large runs. . . . Automotive applications seen offering promising market prospects.

WHAT is believed to be the first commercial plant for production of "investment" castings exclusively in carbon and alloy steel has been practically completed by Michigan Steel Casting Co. and it is now in a position to receive orders for mass quantities in weights from a fraction of an ounce up to about 1 pound and in sizes up to 4 inches maximum dimension.

No newcomer to this field, Michigan Steel Casting has been moving ahead experimentally for the past 7 years, first becoming interested in the process as the result of close association with Austenal Laboratories Inc., New York. When Austenal opened its Chicago plant and began the investment casting of vitallium there, Michigan Steel officials immediately saw industrial possibilities for such castings in steel, where dimensional precision, superior finish and automaticity of production were features.

The war, of course, vastly accelerated progress, and Austenal turned from its production of dentures, jewelry specialties and orthopedic appliances to the concurrent production of buckets for aircraft engine turbosuperchargers, largely as the result of urging by metallurgical experts of General Electric Co., which had designed the supercharger.

Operates Casting Units

Michigan Steel Casting is convinced that the future holds important possibilities for the investment type of casting in high melting point alloys and is spending its own money to prove the point. New plant space has been taken over for the work. Six casting units will be operated, together with the necessary mold and wax pattern making equipment. The "supercast" department, as it is called, will be about as far from the conventional foundry in appearance as it is possible to imagine. Special lighting installations, novel use of color on machinery and walls, even an entire new terminology of equipment, are being introduced, and a working force, largely women, trained to handle production. In the next few weeks the company will sponsor advertisements in a number of trade publications announcing the new activity.

But there is one thing which MISCCO would like to unearth and that is a new name to identify this type of casting, as well as the product itself. The term "investment" casting is not liked because it ties in too closely with process as used in the jewelry and denture trades, and the commercial version of the method is a far cry from these earlier techniques. "Precision" casting is not appropriate either, for although the castings are made to close limits (measured in the thousandths of an inch), many associate precision casting more closely with the die casting of zinc and aluminum. For the time being, until someone comes up with a better name, the company identifies its new project as the "supercast division" and the product doubtless will be called a supercasting.

The term "investment" comes from the mold itself, which is "invested" around the wax pattern and hence is known as an investment. MISCCO is using new terminology for other elements in the process and is training its employes in this division to speak of "mold casings" instead of flasks, "grog" instead of sand mixes, etc.

THE FOUNDRY in its issue of December, 1943, p. 132, carried one of the first summaries of the investment casting process, but it may be well at this time to review the method again in somewhat more detail, as it is practiced commercially by Michigan Steel Casting. It should be pointed out that the procedure and equipment are essentially those developed by Austenal Laboratories, with minor mechanical refinements worked out here. Reason for this is that the Michigan company is a licensee of Austenal which controls basic patents on several phases of the process. Also it may be noted that considerable secrecy surrounds some of the steps, for reasons of both military security and proprietary interest. At any rate, boiled down to its essence, the process goes something like this:

The proposed casting is studied carefully and a master pattern is machined up in steel or possibly brass, with sufficient dimensional increase to compensate for metal shrinkage in the final casting. From this pattern a split die or mold is cast, after careful determination of where the parting line should be. Not much can be reported on this phase except to note that bismuth is one metal which has been used in these dies. Wax patterns are prepared by injecting molten wax under pressure (around 1200 pounds per square inch) into the die. Various types of wax are used, depending upon section thicknesses involved, a harder wax being used where sections are thin, and softer where sections are thick. Removed from the die, the wax impression is now ready to be invested.

In many cases it is possible to produce multiple castings in a single investment, so the wax pattern of the entire casting is made, complete with central gate, runners and sprues. A novel type of test-bar cluster, for example, has been developed by Michigan Steel, in which six test bars, each about ¼-inch in diameter with the ends threaded, are made in a single cast. These were produced for making metallurgical and physical tests in various types of steel to give an indication of the properties to be expected in castings with approximately the same (¼-inch) section thickness.

The wax pattern next is set within the

(*Concluded on page* 151)

POSTWAR METHODS

One of the larger captive automotive foundries in the Detroit area, which in prewar days often poured as high as 700 tons of gray iron daily, now has a staff of three engineers spending their full time planning promotion improvements for postwar application. Their principal concern is adapting improved equipment to the restrictions imposed by the foundry building itself. Coreblowing equipment ranks high on the list of proposed new installations.

Enlarged capacity for several other automotive iron foundries in this district is being actively discussed, the aim in all cases being to devise ways and means to produce a greater tonnage of finished castings for a given expenditure of man-hours.

Solving Tomorrow's Handling Problems *Today*

From the start of this national emergency, Mathews Engineers have burned the midnight oil. Huge layouts, new handling problems, very special devices — and every system vitally needed as quickly as possible. Brass and aluminum, ship and tank plate, aircraft parts and motors, shells and bombs — all had to be handled in quantities up to that moment unheard of. Many normal years of experience have been gleaned from these few months of activity. The ingenious developments in conveying these special materials will serve industry well in the peacetime years ahead, for the more highly developed the manufacturing and materials-handling phases of production become, the greater the number of people who can enjoy the advantages the product affords. It can be profitable to take advantage of the experience of Mathews Engineers. Their service is available in principal cities in the United States and Canada.

Mathews Conveyer Company

ELLWOOD CITY, PENNSYLVANIA

NO CRACKS, NO BLISTERS, NO PEELING ON MOLDS SPRAYED WITH MEXACOTE

Mixed into a paste, then thinned with water to 40°-60° Baume, Mexacote sprayed on molds hits a new high in mold wash efficiency. The surface may be quickly dried, immediately after application, with a blow torch and no matter how severe the torching, it will not crack, shrink, scab, peel, or buckle. Mexacote is versatile—may be used on all kinds of green or dry sand or loam molds. Mexacote is fire proof—it contains no hazardous volatile matter. Mexacote saves time—it helps insure smooth, clean, castings and thus eliminates much of the usual cleaning. Mexacote is the all purpose blacking—equally effective on either molds or cores. When dipping cores apply at 35° Baume; when spraying, apply at 25° Baume. .

In spite of its effectiveness, speed of application and improvement of casting quality, Mexacote costs less than other mold or core washes. If you are interested in improving your casting surfaces, saving time and cutting your foundry costs write us today for complete facts.

Mexacote

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

(*Concluded from page* 148)

mold casing and embedded in the mold material which at the start is in a pasty or gelatinous form. It is a siliceous material with one common type of binder being ethyl silicate, supplied by Carbide & Carbon Chemicals Corp. This is a compound of ethyl alcohol and silica, which, upon standing, is converted to solid silica by evaporation of the alcohol. The mold material completely surrounds the pattern of course, except at one end where a gate is left for connection to the melting furnace. Vibrating the mold casings assures an intimate contact with the pattern which is essential to a good casting.

The molds are air dried to solidify them partially, then inverted on a steam table to melt out the wax pattern, leaving an accurate cavity into which the metal is poured. However, before pouring, the molds are heated in a continuous furnace to a temperature determined by the nature of the castings.

Casting Machine Is Furnace

While still hot, the molds are transferred to the "casting machine", comprising essentially a small indirect carbon arc furnace with charging hole at the top and electrodes entering from either side. The molds are clamped mechanically upside down, with the gate over the furnace opening. Entire assembly of furnace and mold is rotated through 180 degrees on trunnions, depositing the metal in the mold. Meanwhile air pressure is applied to the furnace, ranging from a few ounces to several pounds, serving to give additional force behind the metal as it enters the mold.

Excess metal is avoided by accurate weighing of the charge before it is placed in the furnace. No alloying is done in the furnace, the lining of which is as nearly neutral as possible to avoid oxidizing or reducing conditions in the furnace. Only possible change in metal analysis is pickup of a small amount of carbon from the electrodes, but this may be neglected or, if necessary, compensated for in the charge. A complete cycle of charging, melt-down, application of the mold, removal, and shakeout, can be accomplished in the matter of a few minutes, and the entire sequence can be handled with a minimum of manual labor, being largely "pushbutton" in character.

The investment strips clean from the casting, although it may be necessary to hammer some of it away because it has been baked and slightly glazed at the contact surface. However, an estimated 80 per cent of the investment material can be reused.

From this quick summary it will be seen that an investment casting actually is a die casting made in a refractory mold, although the pressures behind the metal are not nearly as high as those used in typical die casting machines. However, the pressure is essential, since, if it is not used, the casting is likely to be only a hollow shell in portions which should be solid. Attractive though the method may be at the moment, if some technician should come up with a suitable heat-resistant metal, along with means for coating and cooling it so that high melting point alloys could be cast into it under pressure, the need for the more or less complicated investment technique would largely disappear.

Right now, the product possibilities of investment castings are, to say the least, intriguing. James D. Corfield, who has been directing the development at Michigan Steel Casting, claims that given a sufficiently large run of castings, it is possible to beat the price of a comparable steel sand casting and at the same time realize a far better part as far as size and finish are concerned. In fact, he maintains that the economics of the process are pretty well established now, but that some work remains to be done on the metallurgical aspects. All indications, however, point to equally superior metallurgical properties.

Many complicated and odd-shaped pieces which perhaps never could be cast by any other method, yield readily to investment casting. Other shapes, literally whittled out of bar stock or a forging, with as much as 60 per cent waste in material, likewise can be pressure cast in investments at appreciable saving. Several items, identified with still-secret phases of the war program, already have been adapted to the method, for example, S.A.E. 4140 steel.

Prospects look good for similar casting of a variety of cutting tools such as broaches, reamers, milling cutters, etc., which require only a quick sharpening after casting and heat treatment before they are placed in service.

Still further advantage of the method is that it can be made largely automatic, relieving any dependence on the human factor which is so vital in conventional foundry techniques. This means much in terms of uniformity of the product, as well as in lower labor costs. For automotive applications, where production runs can be high, and where uniformity and low cost are prime considerations, Mr. Corfield sees much promise for the future. Already some of the leading automobile builders, including Ford and General Motors, are giving careful study to the method. Briggs Mfg. Co. operates a plant in Cleveland for production of nonferrous castings in investments, but it is believed the ferrous field holds greater opportunities in respect to automotive parts.

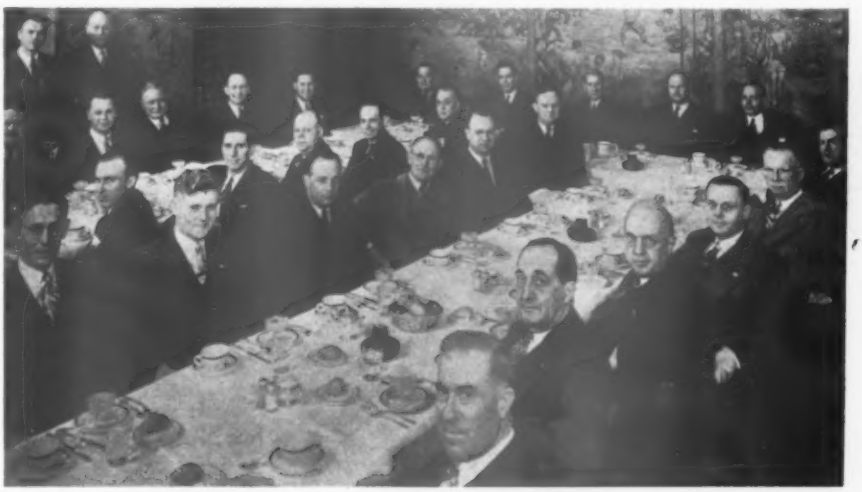
While it is moving enthusiastically into this new venture, Michigan Steel Casting is by no means relaxing its productive effort in its regular lines. Production of steel castings, in carbon and alloy grades, has been running close to 1000 tons monthly for some time, and additional space has been required to handle the capacity output. Two arc furnaces and two induction furnaces are operated in melting work. A wide variety of horizontal centrifugal castings is produced, including many for heat and corrosion-resisting applications.

Plans Expansion After War

The company has maintained a fabricating division for some time and now is completing plans for expansion of this activity in the postwar period. A building originally set aside for this work had to be reassigned for handling heat treating operations, but eventually will be reconverted to fabricating. Assembled products and equipment have run all the way from fractionating towers for the oil industry to a "hot tamale machine" for a Texas entrepreneur.

The latter was an interesting assembly of cast and rolled 18-8 stainless steel elements, involving principally two large hoppers, one for mush and one for meat, plus grinders, tubes, valves, knives and other mechanism all of which helped to deliver at the spout the mush-wrapped tamales, neatly sliced to size.

Paul Goetcheus, until recently associated with Steel Sales Co. in Detroit, is now affiliated with Michigan Steel Casting, and will devote his entire time to engineering problems in connection with the fabricating division.



SALES CONFERENCE: Officers and representatives of the National Engineering Co., Chicago, shown at their recent annual conference held at the Union League Club, Chicago

A PRACTICAL FORMULA FOR BLAST CLEANING efficiency

EFFICIENCY is America's overpowering wartime weapon . . . in the post-war competition it will be a prerequisite in maintaining business leadership. And efficiency in metal cleaning can be an important factor in lowering costs and bettering competitive positions. Here is a typical "case history"!

The 202-year old Taylor-Wharton Iron and Steel Company has served our country in war production through every war in its history. In World War II, when heavy production demands were to be met, the hand blast cleaning process was found inadequate.

Faced with the necessity of finding a more satisfactory method of cleaning seamless steel gas cylinders they called on our engineers. After a thorough survey of the problem, a carefully designed Wheelabrator Special Cabinet was recommended. As the work passes into the blast zone, steel abrasive thrown from an Airless Wheelabrator thoroughly scours the surface right down to the virgin metal.

Whereas each piece required five or six minutes to be cleaned by sand blast, *three* cylinders are now Wheelabrated in *one minute*. Production flows 15 times faster than under former methods.

You are invited to submit your problems and samples of your work to our engineers for test-cleaning in our complete laboratory—they are qualified by wide experience to give you a practical "formula" for the efficient handling of your metal cleaning problems.

WHEELABRATOR
AIRLESS BLAST CLEANING

ARMY NAVY

THE AMERICAN MOLDER

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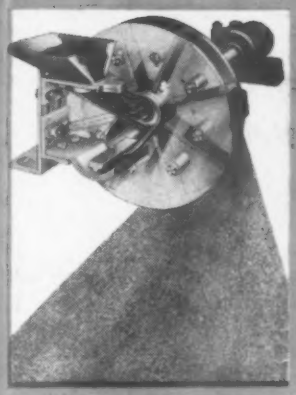
WORLD'S LARGEST BUILDERS OF BLAST CLEANING EQUIPMENT

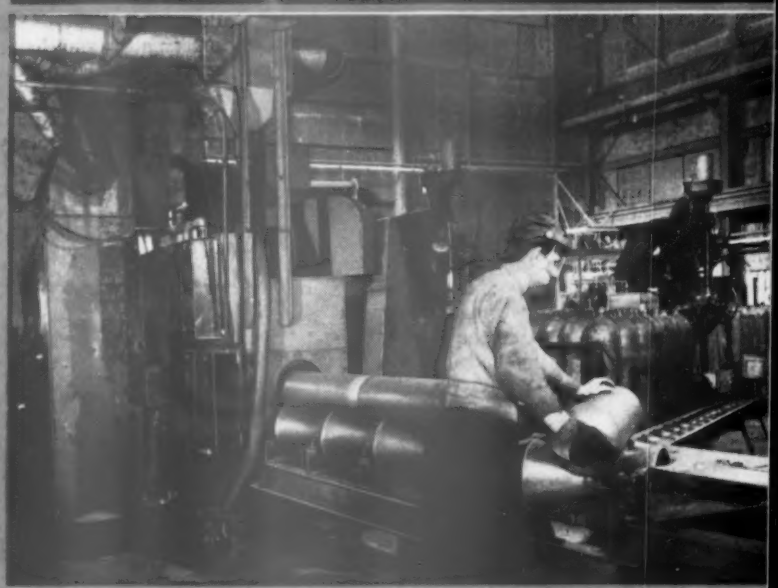
WHEELABRATING
The Airless Abrasive Blasting Method



Wheelabrating is a simple centrifugal method of abrasive blasting. By eliminating the use of costly compressed air it greatly reduces horsepower requirements . . . often as much as 80%. The Wheelabrator throws up to 300 lbs. of abrasive per minute in a continuous stream, greatly exceeding the amount thrown by three 3/8" nozzles using 90 lbs. air pressure.

(Upper Photo)
Gas cylinders waiting to be cleaned by the Wheelabrator Special Cabinet.

(Middle Photo)
Skewed dished rollers rotate the work at a predetermined speed during cleaning.



(Lower Photo)
A complete conveyor system handles the work so operations are continuous.

American

FOUNDRY EQUIPMENT CO.

505 SOUTH BYRKIT ST. MISHAWAKA, IND.

BY PAT DWYER
Drawings By RICHEY

COMING up for air during a brief pause between sessions at the recent foundry convention in Buffalo, I ran into Bill leaning against a pillar in the hotel lobby. To be strictly accurate, a feature strongly emphasized by a speaker at the session I had just quitted, perhaps I should qualify that statement about running, and admit that I more or less drifted into the area not immediately occupied by his big feet. The word running indicates fairly rapid motion and I was not indulging in any rapid motion at that time of the day. My feet were not exactly killing me, as the saying goes, but I did not need the orchestra to remind me of "What do we do in the infantry? We march, we march, we MARCH!"

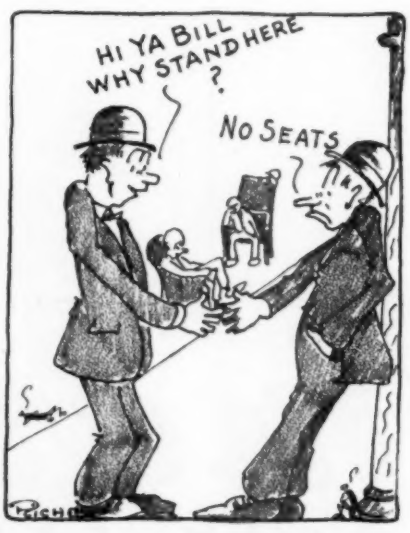
Bill nodded gloomily when he saw me casting furtive glances up and down the lobby.

"No soap," says this honest yeoman. I been standing here for 8 (Count 'em, 8) solid, standard golden minutes, each set with 60—you can also count *them* if you have the time and the inclination—60 diamond seconds. As the old copy book headline used to say in characters I never could imitate 'No reward is offered as they are gone forever.'"

"And pray, my good man," I said, "why have you stood here, giving a fine and realistic imitation of a Northwest totem pole, one of the more or less gruesome statues from the Halls of Montezuma, or an Egyptian mummy? Why don't you lower yourself into one of these heavily upholstered chairs, divans, sofas and so forth scattered around the lobby by a prodigal management that thinks of nothing day and night but the comfort, ease and well being of its patrons? I pause for a reply."

"Ignoring for the moment the totally uncalled for—and probably prompted by jealousy—references to totem poles and one thing and another, I can tell you in a word—well maybe two or three words—why I am standing here. If you really want to know, and if you are not talking simply because you can't keep your trap shut from one minute to the next, I am standing here because I can't find a place to sit down. Seats are occupied by a flock of characters male, female and unclassified, differing widely in length, beam, displacement and tonnage, but all uniform in the ability to remain solidly anchored in every berth on both sides of the lobby. In the old time games of 'Musical Chairs' and 'Puss in the Corner' every person had a chance to grab a seat now and again, but in this here game as played by a bunch of satellites—and a very good name if you get the connection—in this game an outsider has as much chance of getting a seat as a Jap has of getting a seat in the White House. I wonder if I could play 'Puss in the Corner' with that sour looking old dog sitting there across the lobby and looking like a graven image afflicted with the botts and ingrowing toenails. Do you think I could get away with it if I hit him a belt on the puss and knocked him into a corner so that I might grab his chair?"

"The general idea," I admitted, "has considerable merit and I will not deny that at times I have been subjected to a similar temptation. However, up to the present I have been able to restrain myself and thus probably have escaped the penalty of paying a good healthy fine, or of spending some of my valuable time in a jail, where I have been given to understand the seating and other accommodations are not on a scale that would prompt one to write home about them. If you will be guided by the advice of a true friend, to wit, the present speaker, you will stay where you are, keep your big hairy paws in your pockets and conjure up in your mind, images of sweetness and light. If you want to sit down, why not go up to your room—presumably you have a room? — and stretch yourself out in two chairs. You could shed the coat and vest, kick off the brogans and at a pinch, and in the current vernacular, tear yourself off a hunk of what the late Mr. Shakespeare refers to as nature's sweet restorer, balmy sleep."



Standup job is not appreciated

"Balmy sleep, sez he! I can get all the sleep I need when I am at home. I should go to a foundry convention where there is something going on at all hours of the day and night, and then shut myself up in a room like a blinkin' clam or dainty little Snow White after she et the poisoned apple in the dwarf's little cot in the dell. Not me, my boy. I want to see all I can see. Hear all I can hear and certainly I want to meet all the boys of the Old Brigade, some of whom I have known since they were young men and others who have favored me with their friendship in more recent years.

"One of the current traditions of the foundry is that molders never die. While that may be true—mind you I ain't saying it is and I ain't saying it ain't—still the fact remains that one sometimes is at a loss to recognize a man he has not seen for 40 years or more. A heavily upholstered and prosperous looking citizen without a single hair on top of his head called me by name yesterday and shook me warmly by the hand. Noting by my dropped jaw and vacant eyes that I did not know him from Pontius Pilate's billy goat, he grinned and recited a nonsense verse: 'I might be humpy-dumpy, I might be a kangaroo. I might be hanky-panky or a monkey in the zoo. I might be an oyster or I might be a clam. But by the hoky-poky now, I wonder who I am.'

"The years fell away by magic and I saw myself in company with this lad sitting in an open air theater in a Connecticut town one night in the year 1900 while a vaudeville singer chanted this very same verse and another half dozen which I have forgotten. The same magical formula or element or whatever it is, stripped the portly bulk in front of me like you see in these reduction advertisements showing a slim, sylph like figure in white inside a great black blob. The blob is the patient before, and the white ethereal creature is the same person after taking three bottles of the marvelous reducer Takitoff, spelled T-A-K-I-T-O-F-F—"

"Less of it. Less of it my good man. Spare me the nauseating details. Carry on from the point where this tubby friend of yours shrunk to a mere 120 pounds, all bone and muscle, with a mane of hair that would do justice to a hottentot, cut short behind and a long lock that hung down over his forehead. Every few minutes he had to lift his head and toss this hair back out of his eyes, for all the world like a startled

(*Continued on page* 156)

Cranes and tracks for pouring.

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Ideas FOR POST-WAR PRODUCTION

Here are several American MonoRail installations which have proven successful in low cost handling. Any plans for postwar production should include such handling methods.

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A 56-page book showing successful applications of American Mono-Rail Systems.

Scale and lift to charge floor.

Mechanical charging brings better metal.

(*Continued from page* 154)

wild mustang when he sniffs the tainted breeze."

"Pon my word," said Bill, "'Tis positively uncanny. Vos you dare, Sharlie?"

"I did not have to be there. All the young men of the period wore their hair in that manner. The smooth and shiny heads which have persisted down to the present came in several years later, inspired by the movies. No picture is complete unless it includes a night club scene where Jack and Jill and all the other characters have a chance to strut in evening clothes. The men's hair is slicked down and varnished to match their patent leather shoes, while the ladies give as close an imitation as possible of Aphrodite rising out of the sea. The movie magnates claim this is educational propaganda designed to raise the minds of the spectators to a higher plane and induce them to go out and do likewise. As a preliminary step toward this highly desirable goal all the young men daub their hair with some repellent form of googum that eventually will cause it to fall out as readily and rapidly as the fur from a genuine Russian Omigoshski coat marked down Special For Today Only $24.79.

"Your pardon my dear young fella for getting slightly tangled in your hair. If my memory serves me correctly, you were saying something about meeting a substantial looking citizen who claimed to have known you at a time when you both were kangaroos or something, no doubt from your habit of hopping around from one job to another with little or no provocation. Did he touch you for a small contribution to go in his pouch?"

"Some one should take you by the hand and teach you the facts of life—about male kangaroos. This lad I am telling you about showed me a clipping from the *Boston Traveler*. Some person had asked 'What is the largest single iron casting' and the *Traveler* had replied: 'It is said to be the figure of a lion 20 feet high made nearly 1000 years ago in an old Chinese city.' My old friend says to me, sez he, 'You get around a bit Bill. What do you know about that, hey?'

"As with nearly all newspaper items, the clipping is partly right and partly—shall we say—misleading, at least to a foundryman. When a foundryman talks about a large casting, he attaches more importance to the weight than he does to the size. Making a mold involves a certain amount of skill and ingenuity, but melting, transporting and pouring a large volume of metal, generally constitutes the real problem. The large lion casting probably is the *largest* iron casting in existence, but it is not the heaviest. That distinction rests with the anvil block, 600 tons, cast in or near the Russian city of Odessa about 1865 or 1866. I read a description of the job in *The International Molder's Journal* many years ago.

"At the Milwaukee convention of the A.F.A. in 1937 Prof. Thomas T. Read, Columbia University, presented a great deal of historical information under the title *Ancient Chinese Castings*. The following excerpt deals with the Chinese lion:

Evidence that the Chinese were the first people to make iron castings on a commercial scale, long before the art was developed in central Europe in the fourteenth century, is overwhelmingly conclusive. One such bit of evidence is the largest iron casting ever made, still standing where it was cast in 953 A.D. in the yard of the Kai-Yuan monastery, Ts'ang-chou. It is a hollow image of a lion about 20 feet high and 16 feet long. The metal walls vary in thickness from 1½ to 8 inches. As a technical achievement it cannot compare, for example, with the cast iron housing of a modern turbine. A casual inspection reveals that it was made according to the technique employed in constructing a modern concrete structure by pouring small sections at a time. The core, properly reinforced, was built up first. Then sections of the mold were built up on the outside. Spaces between core and mold were filled in succession with relatively small amounts of metal. The weak joints are quite visible. This weakness did not matter, since the lion was a religious art object without any need for mechanical strength, and besides it did not have to be moved or shipped from one place to another.** ** There can be no doubt of the date of this casting, since like a modern bridge or public building, the date was placed upon it when it was made.

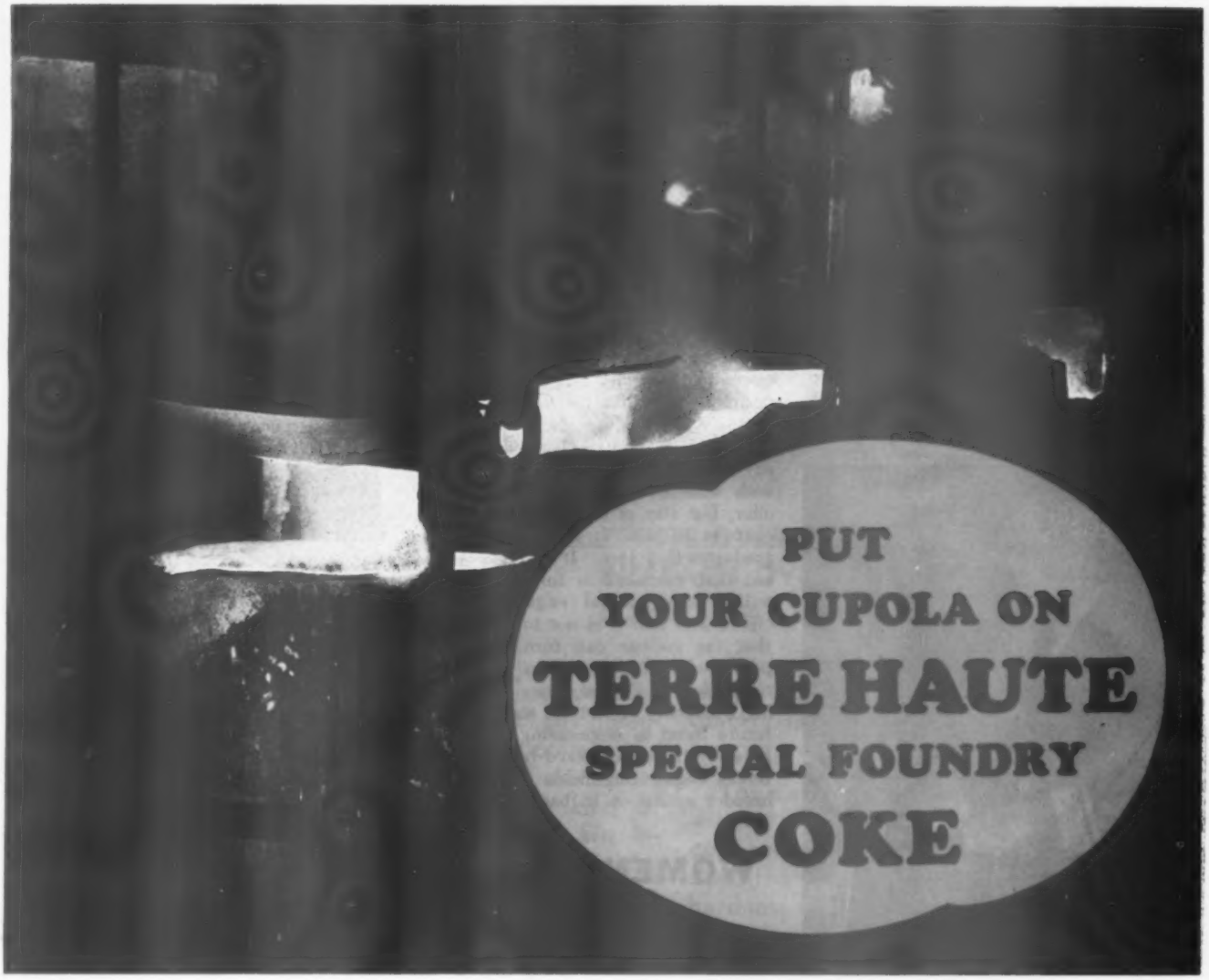
"The professor did not say," Bill added, "whether or not the names of the mayor and members of the council appeared on some prominent part of the noble animal. I guess it is fairly safe to assume that the names of the men who actually built the job were carefully omitted.

"Certainly it is a large casting, but at a rough estimate, allowing for a 10 feet diameter body and an average metal thickness of 4 inches, the total weight would be only about 50 tons. A few months ago right here in a Buffalo foundry, I saw a 130-ton anvil base, for which 145 tons of iron were melted and poured. The casting later was shipped hundreds of miles to its ultimate destination. Fifty-ton castings are not regarded as curiosities in the gray iron foundry field. As for size, many machine tool bases and other iron castings, while not as high as the lion, are two or three times as long. I cannot give the reference offhand, but when the New York Elevated railroad was built, about 1880, Jim Floyd cast some columns 51 feet in length for a section of the Ninth avenue line where the road goes round a curve at 110th street. If a person wanted to make a comparison he could point to the hundreds of marine engines built during the past two years. They are made in sections bolted together to form a unit approximately as large as two Chinese lions and three times as heavy. Steel locomotive frames nearly 70 feet in length and including everything from the tender to the cylinders are cast in one piece.

"In my little black book where I jot down interesting references now and again I find further description of heavy castings published at one time or another in THE FOUNDRY: Japanese

(*Concluded on page* 244)

Any resemblance to a real lion, or to any of your liein' friends or neighbors is merely accidental and coincidental



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SUCCESSFUL A.F.A. CONGRESS

Marked by Record Attendance

(*Continued from page* 113)

to the engineer, according to the speaker, are: (1) Research, the search for new or better products, new methods and materials; the solution to many problems in the design and machining of castings. (2) Equipment, including design of new devices or structures, changes in design, installation layouts and certain types of maintenance. (3) Marketing of the product, aiding customers to make best use of the facilities or product; in fact,

Rear Adm. A. H. Van Keuren, director, Naval Research Laboratory, addressing opening session of A.F.A. congress

his training suits him well for sales, advertising and even financing.

Mr. Fletcher urged foundrymen to emphasize the opportunities and attractions offered by their industry, rather than stress its less desirable features, in speaking to the young engineer. Another recommendation was to start the new man in the shop by treating him in an understanding manner, as one seeking to learn, and by giving him engineering responsibility once he has become acquainted with foundry operations.

Speaking on "Employment of Technical Graduates in the Foundry Industry," C. L. Heater, vice president, American Steel Foundries, Chicago, emphasized that a continuous inflow of technical trained men is necessary if the industry is to show steady progress, because employment of engineering graduates will tend to spur technical research. Foundries have good opportunities to offer the young engineer, but the industry has failed to publicize itself properly. Men should be picked carefully—for careers, not merely jobs. They should have broad, rather than centralized interests. They need not be the best students of their class. What is wanted is a man who is a logical thinker, and although this type is not confined necessarily to engineering graduates, it is more likely than not to be found in that group.

A careful training program is necessary after hiring, involving a year or more to become acquainted with the general procedures followed in the various foundry departments. A point to remember in laying out the training program is that more men are lost through lack of opportunity to utilize their capacities than through overloading them with work.

Later discussion emphasized the necessity not only of acquainting educators with what the foundry industry has to offer, but also of educating foundry executives in how to handle engineering graduates they hire. It also was pointed out that the need is for graduates familiar with general engineering principles, and that it is not to be expected that the college can turn out an experienced foundryman. In this connection, Clem J. Freund, dean of engineering University of Detroit, stated that the future trend in engineering schools will be away from specialized training in different engineering fields and toward a broader education in basic principles.

WOMEN TRAINED

As Foremen

A FREE and easy discussion of the many problems involved in the development and operation of a foreman training course characterized a dinner meeting Tuesday and furnished a general background for the formal meeting that followed, which was presided over by W. G. Conner Jr., Walworth Co., Washington Park, Ill., chairman and W. E. George, Booz, Allen & Hamilton, Chicago co-chairman. The following papers were presented: "Training of Foremen on the Job," by F. K. Dossett; "Training Foremen to Handle Women," by W. J. Hebard; "Women as Foremen," by S. M. Brah; "The Post War Foreman," by T. H. Booth; "Training Foremen Through the Conference Room Method," by Steven G. Garry.

Mr. Dossett, director of supervisory training Thompson Products Inc., Cleveland, stated that any comprehensive training program must provide the foreman with a clear understanding of the following basic factors; Technical *know how;* scope of responsibilities connected with the job; relative position of all members of supervision as indicated on an organization chart; relation of manufacturing to all other essential phases; company policies and practices set by top management; governmental regulations under which industry must operate; the complex human factors involved in the efficient handling of industrial man power. This was followed by detailed reference to four basic training techniques: Conference method, lecture conference method, mass meeting and written messages.

In presenting the paper "Training Foremen to Handle Women," by W. J. Hebard, personnel director, Continental Foundry & Machine Co., East Chicago, Ind., F. E. Wartgow, American Steel Foundries, Chicago, pointed out that foremen generally are brought together for conferences on the analysis of

H. S. Colby, consultant to deputy vice chairman for production, WPB, discussing manpower problems at A.F.A. congress session

present jobs suitable for women; breaking down of present jobs, parts of which will be suitable for women; training program to be arranged for each occupation or group of related occupations; methods of getting women started in each department; comparisons with other plants in the area and in industry; special problems in dealing with women, etc. He also touched upon the use of pamphlets, and on accidents; personnel problems, foremen and counsellors and wage rates.

Discussing "Women as Foremen," S. M. Brah, training adviser, Rustless Iron & Steel Corp., Baltimore, claimed that supervisory requirements for any job may be condensed into the following five responsibilities: Job knowledge; knowledge of the company policies, rules and agreement existing between the company and the union; ability to instruct workers in manual jobs; ability to plan, schedule and develop better methods; ability to maintain good management-employe relations. While it is not traditional practice to recruit women for apprenticeship, it must be remembered that many male

(*Continued on page* 161)

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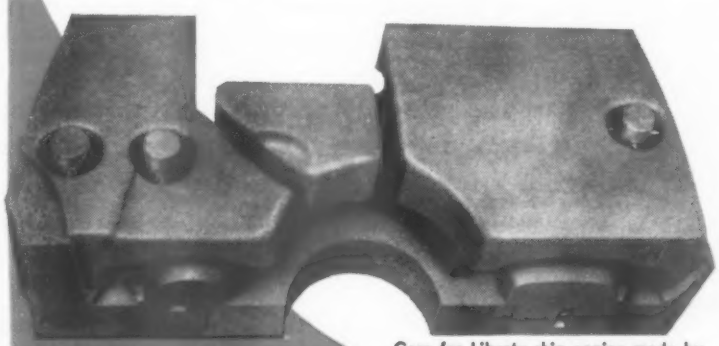

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HOUGHTON FOUNDRY RESEARCH HELPS

America's Core Rooms

(*Continued from page* 158)

supervisors have not served apprenticeships. They are selected because of various characteristics other than the qualification of being the best mechanic in the shop. Summarizing the entire problem of hiring women as supervisors in foundries, it is more logical to employ them as supervisors than as production workers.

However great the technical demands, the requirement in personnel administration is even more important, according to T. H. Booth, works manager, Walworth Co., Washington Park, Ill., in a paper entitled "A Post War Foreman." While the foundry became more complicated and technical, there has been a revolution in the relations of management and labor. There has been a tendency to concentrate the handling of these relations in personnel officers, but the foreman must be the first and continuous contact. Employes look to him for leadership. A specialist from the front office is not a satisfactory substitute for a man who can yes and no right on the job. In developing this theme the speaker touched upon wages, grievances and shop conditions. If the American way of competitive free enterprise is to go on, industry must do it to the satisfaction of the public. This requires preparation, courage and energy. No one will play a more vital part than the foreman.

Steven G. Garry, superintendent of the core room, Caterpillar Tractor Co., Peoria, Ill., described the method of training foremen through the conference method. Referring to who shall attend these conferences and how they shall be grouped, he stated that the answer is governed by several factors including: Extent and scope of the program; number of people available as leaders; general nature of the organization. Management may pick certain representative foremen or supervisors in each department or division and recommend them as members of a group. Careful selection of open minded, trainable men will do much toward instilling in others a desire to attend similar conferences. Requirements and conditions will vary in almost every plant.

GRAY IRON MEETINGS

Study Production Problems

USE of the four-part cheek method of molding gray iron cylinders was described by Robert Hendry, Beloit Iron Works, Beloit, Wis., at the Wednesday morning session on gray iron castings. Russell J. Allen, Worthington Pump & Machinery Corp., Harrison, N. J., presided, with W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee, as co-chairman.

Mr. Hendry presented numerous slides to illustrate the practice followed by his company in casting low pressure steam cylinders for ship engines. The foundry previously had specialized in manufacturing paper machinery, and upon converting to engine work studied the methods employed by companies already engaged in casting cylinders of the same type. It was discovered that at least five different methods were utilized for molding the cylinders. Some foundries used all cores on the outside and cast the cylinder on end; others used a cheek split into two parts, bottom and top halves. It was found that less scrap castings resulted when the castings were molded by the cheek method.

In one foundry employing the cheek method, the cores were set in the drag, then the bottom half of the cheek was set on the drag over the cores. The top half of the cheek then was placed in position and the remainder of the cores set into the mold. Due to the depth of the mold and to the cores being placed one on top of the other, it was necessary that chaplets be used. In addition, considerable dirt collected in the mold—an unsatisfactory condition since the castings were required to withstand water pressure. Finally it was decided to use the four-part cheek method and eliminate many cores by ramming the cheeks in the foundry, using molding sand. This method permitted the internal cores to be set in place before the mold itself was completed, and eliminated the use of chaplets at vital parts of the casting. The method has proved successful both in producing satisfactory castings and in saving time; it has resulted in one of the best in the shop when computed on a tons-per-hour basis.

Second and concluding paper of this gray iron session was a practical and comprehensive discussion of fundamentals involved in molding methods for the production of sound castings. The speaker, Fred G. Sefing, International Nickel Co., New York, pointed out that sound principles of casting are applicable to all types of metals. Further, that a thorough understanding and application of only a few principles is necessary to make sound castings. Points to be observed he listed as follows:

1. Pouring gates should be designed so that clean metal enters the mold quietly and rapidly. Rectangular gate cross sections are preferred to square or round sections.

2. Controlled directional solidification assists the freezing of the casting to begin at the coldest metal and thinnest sections, and to move progressively toward the hottest metal and heaviest sections.

3. Design and pour risers so they will feed castings by conforming to the principles of controlled directional solidification. Allow plenty of pressure to act on the molten metal in a feeder.

4. Knock-off risers are convenient to remove and they feed adequately.

5. Chills or denseners are used where risers are impracticable, or where it is desirable to assist the freezing rate.

6. Adequate venting of the mold cavity permits filling the mold easily by preventing back pressure. Gas absorption by the metal in the mold also is reduced by good venting.

It was recommended that foundries, particularly jobbing shops, making a wide variety of castings, keep complete records of the successful molding practice of each casting. The best record is a photograph of the casting as poured, indicating all gates, feeders and chills, and marking all dimensions. At any future date, the casting can be duplicated without trouble by referring to the record.

Meeting of the Gray Iron Division, with Max Kuniansky, Lynchburg Foundry Co., chairman, and A. J. Edgar, Gray Iron Founders' Society, co-chairman, heard a plea for designing engineers to give more thought to the specifications and properties of gray iron which are of immediate and practical concern. The plea was voiced by R. G. McElwee, Vanadium Corp. of America, Detroit, who added that while the gray iron industry has been lax in providing sufficient engineering service in its contacts with designers, there are some examples of foundries which maintain such a service, with representatives who can discuss intelligently the properties which their product can provide and can assist in writing a specification so that these properties may be made useful.

Gives Numerous Examples

Mr. McElwee cited examples with which he was personally familiar in the adaptation of cast iron to automotive parts—a crankshaft and a differential carrier. In the case of the crankshaft, the cast part was made just as a dimensional check in a test engine, but it was finally decided to run the engine with the cast shaft. Even with bearings purposely misaligned, the shaft gave performance which was surprising to test engineers.

The differential carrier was being specified in malleable iron with a 15 per cent elongation, a specification which had little bearing on the application since 0.001-inch distortion in the carrier would result in a noisy axle. Engineers were specifying the high elongation because they thought this would give high impact values. In this case, as Mr. McElwee asked, why not specify impact value?

It is possible foundries have gone too far in emphasizing relatively high modulus of elasticity of gray iron, a factor not so important in heat applications, for example, where resistance to shock and cracking under heat are the principal requisites. Wear characteristics of gray iron are given insufficient attention in specifications. They are related definitely to microstructure, not tensile strength, and it is conceivable that suitable "wear structure" specifications could

(*Continued on page* 164)

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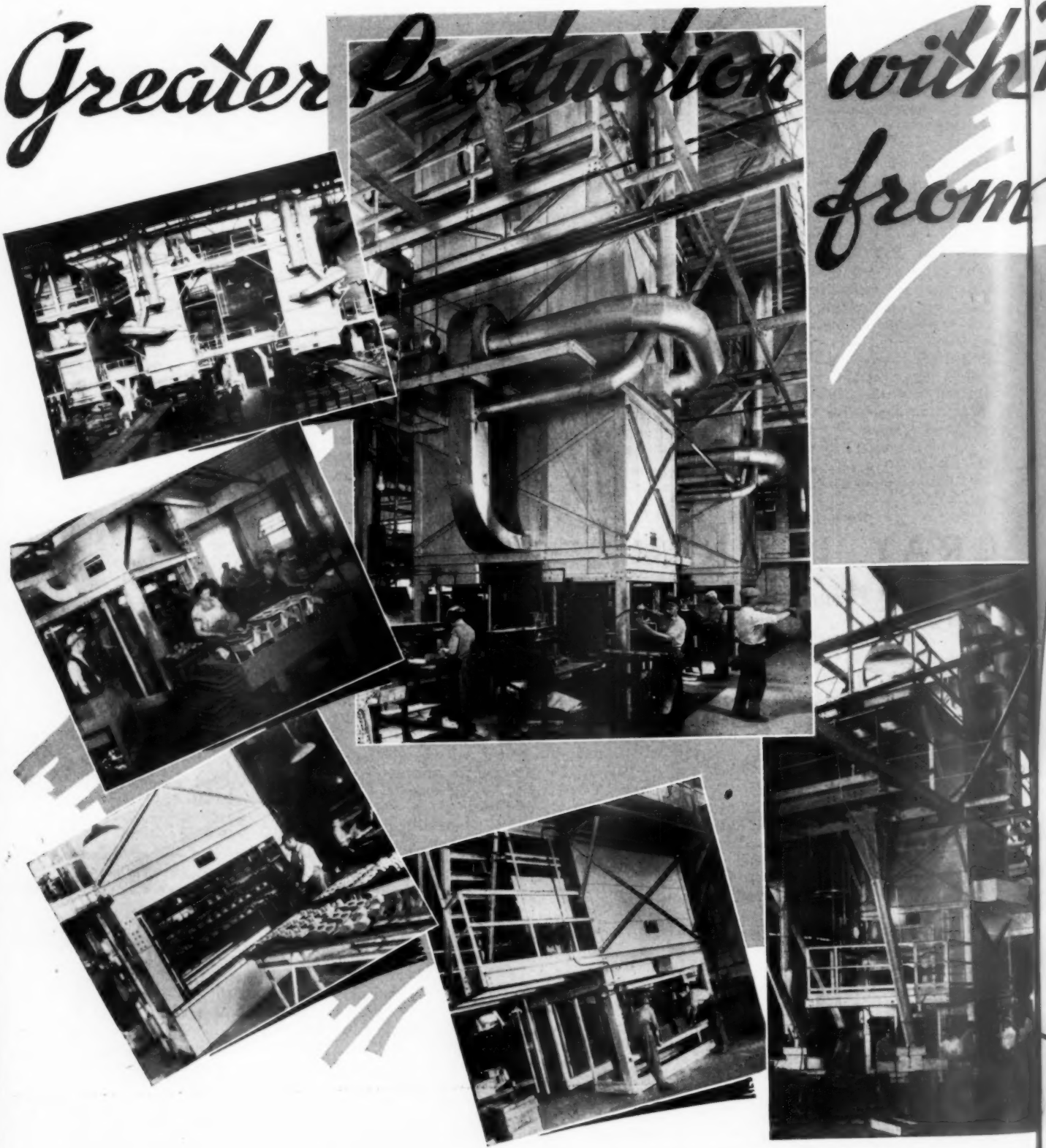

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(*Continued from page* 161)

be developed.

In general, Mr. McElwee pointed out there is too much emphasis placed on tensile strength in gray iron specifications. Depending upon the section involved and the facilities for heat treatment procedure, specifications can be provided which will result in any reasonable combination of properties to cope with engineering requirements. A suggested policy to further this realization of the full range of engineering properties of gray iron might be to train young men in the rudiments of mechanical engineering and then teach them a broad course dealing specifically with castings. Such men would be capable liaison agents between the foundryman and the designing engineer.

W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee, approved the suggestions advanced by Mr. McElwee, but added further that engineers themselves often do not know what properties they want in the part they are designing. They confuse such properties as creep and growth; and they need a better appreciation of the effect of section size on properties. Some engineers, he pointed out, are leery of all castings, simply because of one particular foundry having fallen down on the job.

Perform Tests on Castings

H. A. Bornstein, Deere & Co., Moline, Ill., recommended that where possible physical tests be made on the castings themselves instead of on test bars. He also recommended adoption of the term "yield strength" instead of "stiffness" or "elastic limit", pointing out that stiffness is dependent on the modulus of elasticity and not on tensile strength.

E. E. Marbaker, Mellon Institute, Pittsburgh, presented a detailed progress report on the cupola handbook which he is editing as a part of the A.F.A. cupola research project. The book now is largely complete, except for a section on refractories, and this has been assigned. However, review of all the written material by the steering committee of 150 is a tedious matter, and it is not likely the publication can be completed before the first of the year.

Scope of the book is indicated by a summary of its sectional contents: Introduction; engineering description of the cupola; refractories; charging equipment; air supply, covering such things as blowers, meters, gages, etc.; temperature measuring equipment; gas analysis equipment; ladles; special handling equipment; slagging equipment; raw materials, including pig iron, scrap, alloying metals, coke, fluxes, slags and desulphurizers; operating procedure; technology of combustion; special types of cupolas such as the balanced blast and hot blast; dry blast techniques; and the metallurgy of cast iron.

Asserting that the ladle treatment of cast iron eventually will be considered as essential as final deoxidation treatments in the case of steel, C. O. Burgess, Union Carbide & Carbon Research Laboratories, Niagara Falls, N. Y., said that ladle inoculation has been found to produce cast irons of uniformly high physical property and low chilling characteristics. In a paper prepared by himself and his associate, R. W. Bishop of the same company, he described experimentation in which the value of ladle inoculation was demonstrated by chill tests, physical tests and structural examination of cast irons before and after treatment with a strong inoculant. Marked reduction in chill or wall sensitivity following inoculation was found to extend materially the composition range within which gray irons are resistant to chilling. The cast irons covered a carbon range of approximately 2.75 to 3.40 per cent and a silicon range of 1.0 to 2.5 per cent.

In the experimentation, a silicon-manganese-zirconium inoculant was selected, an inoculant that has been extensively employed in commercial operation, and as a consequence some direct comparison between its effect on the series of experimental heats and on commercial heats was made possible. A relatively low carbon content was indicated as essential for the development of optimum mechanical properties. Apart from selection of cast iron of suitable analysis, the ladle inoculation process as a whole was found to be dependent on the inoculating power of the ladle addition and its ability to produce a uniform product.

Preparing Casting Surfaces

Commercial applications of a new process for preparation of casting surfaces were discussed in a paper presented by J. H. Shoemaker and H. G. Webster, president and chief chemist respectively, Kolene Corp., Detroit. The process consists primarily of catalyzed salt bath. It is a combination of salts which permits the removal of the soluble impurities at the surface of machined or unmachined cast iron, and at the same time oxidizes, thus removing the free graphite or graphitic carbon at the surface of the machined iron. A reducing bath, at a temperature of 220 to 250 degrees Fahr., often is used where necessary to remove the oxide having been previously formed by the No. 1 salt bath, without exposing additional carbon or graphite. This water solution salt bath is followed by a second water rinse, preferably boiling hot and agitated to remove any residual salts left on the surface of the part being processed. The authors report that by a discovery of a molten salt oxidizing bath which can be operated below 1000 degrees Fahr., it is possible to thoroughly cleanse and prepare all ferrous castings known to them, whether the surface of the castings be machined or unmachined.

A paper, entitled "Factors Involved in Superheating Gray Cast Iron and Their Effects on Its Structure and Properties," by A. Wm. Schneble Jr., metallurgical engineer, Advance Foundry Co., Dayton, O., and John Chipman, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., was not formally presented at the meeting as scheduled. However, preprints had been made available, with a result that there was some discussion of the subject.

The paper claimed that the effects of superheating on the properties of gray cast iron depend upon closely related variables which also influence the structure. Discrepancies in the literature on superheating effects were ascribed to failure to take these other factors into account. To study these factors a series of gray irons was prepared in a 10-pound induction furnace built for melting and casting in vacuum or controlled atmosphere and with carefully controlled temperature.

It was concluded from the experiment

(*Continued on page* 166)

Partial view of exhibits on main arena floor

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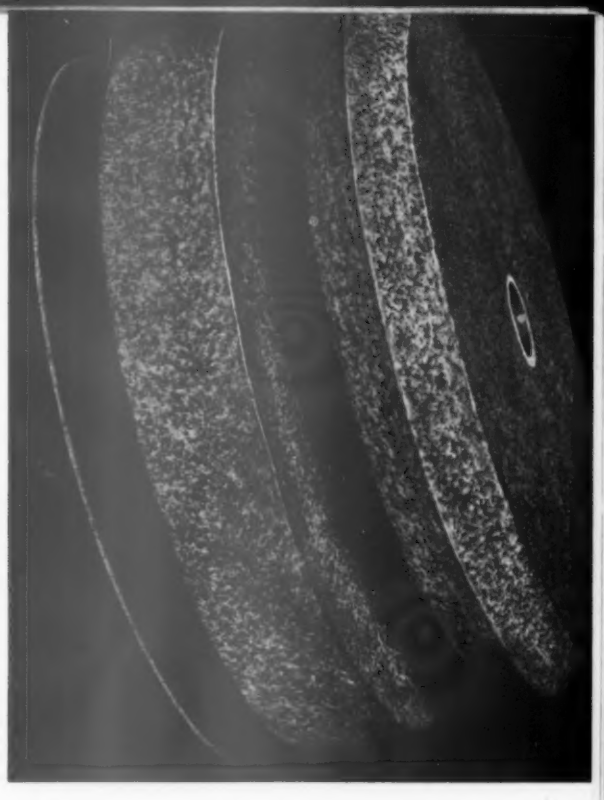

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CENTERLESS GRINDING
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SEMI-POLISHING
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ABRASIVE WHEEL DEPARTMENT

THE MANHATTAN RUBBER MANUFACTURING DIVISION
of RAYBESTOS-MANHATTAN, INC.
EXECUTIVE OFFICES **PASSAIC, NEW JERSEY**

(*Continued from page* 164)

results and a discussion of theoretical considerations that the effects of superheating were not due to nucleation processes, and that the presence of gases in the melt appeared to be entirely responsible for the reported effects of superheating. It was also concluded that the presence of carbon monoxide was the chief factor operating to produce the effects of superheating; also that this gas acted as a graphidizer during solidification, and that the principal effect of hydrogen was that of a carbide stabilizer or carbon monoxide remover.

Data on the investigation of graphite formation, by James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala., was presented by Mr. Donoho, of that company.

GATING AND RISERING

Feature Malleable Meetings

TWO sessions devoted to a malleable symposium, a roundtable discussion, and a technical session featured the malleable program. C. F. Joseph, Saginaw Malleable Division, General Motors Corp., Saginaw, Mich., served as chairman at the first session of the malleable iron symposium on gating and risering. He stated that this was the third in a series of similar meetings sponsored at this and preceding conventions on different phases of malleable iron practice. Others are planned for the future and eventually the entire proceedings will be compiled and issued in book form to form a valuable addition to available foundry literature.

C. C. Lawson, Wagner Malleable Iron Co., Decatur, Ill., in presenting the first paper at this session claimed that a proper amount of preliminary work should be done before the drawing enters the pattern shop. Skilled, practical men should decide on the general design of the pattern and on the details of risers and gates. He pointed out that skill in this direction appears to be a type of intangible knowledge that as yet has not been expressed by any definite set of rules. Engineers design castings to fit into a general plan or to serve some definite purpose, but in many instances the engineers are not familiar with foundry practice, or with what is and what is not within the scope of practical accomplishment.

Should Study Plans

Foundrymen should have a chance to study the plans while the casting is still in the blue print stage. Suggested changes in parting lines, additions of fillets, even distribution of metal, are important factors in eliminating shrinkage and cracks, feeder bobs, risers, tunnel cores, extra sprues, chills, etc. With the aid of slides he described various forms of defects, with causes and remedies.

The second paper presented jointly by E. F. Waterbor and E. E. Lauren, Michigan Malleable Iron Co., Detroit, covered a method of gating which to a considerable extent eliminates the usual type of risers and insures a yield of hard iron castings ranging from 60 to 80 per cent. Typical castings shown on the various slides ranged in weight from 6 to 395 pounds. Briefly the method consists in pouring the metal into an exceptionally large sprue fed from a large pouring cup and discharging through a suitable number of pencil openings into a gate provided with a choke and entering the mold cavity at a point at or near the bottom. The theory back of the method is that the choke regulates the speed of entry, the pencil gates serve as a strainer and the large sprue and pouring cup provide the last and therefore hottest metal to feed the casting or group of castings in the mold. The paper provoked considerable discussion.

In the third paper presented by Morris L. Hawkins, Stockham Pipe Fittings Co., Birmingham, the author described in detail many features involved in the production of sand cast malleable iron pipe fittings in a foundry where duplexing is practiced with cupolas and air furnaces. After all the design features are ironed out for any given job a wood pattern is used to make several trial castings. These are tested to meet ordinary and extraordinary regulations and specifications, and any necessary adjustments are made in pattern and auxiliary rigging. Then a metal pattern is made and mounted on a plate and placed in production.

Permanent gating arrangement for patterns mounted on a single matchplate were illustrated by a number of slides. The speaker emphasized the necessity for close control of sand, metal composition and melting and pouring temperatures for the manufacture of sound, pressure tight malleable iron pipe fittings.

Three papers were presented Wednesday morning at the second session of the malleable iron symposium on gating and risering, presided over by James H. Lansing, Malleable Founders' Society, Cleveland. The first speaker, A. J. Klimek, Albion Malleable Iron Co., Albion, Mich., prefaced his remarks by the statement that his paper was based on his own experience and practice together with observation of trends within the industry. He claimed that practically every job is a problem in itself and every plant has its own particular conditions. No originality was claimed for methods which he proposed to discuss in a plant where duplexing melting is practiced and where metal is poured continuously 16 hours per day. Castings range in weight from 0.10 to 300 pounds. Molds are gated in a manner to provide in a reasonable measure control of metal flow through chokes in the runner bar, or by passing the inlet to header base nearest the sprue.

Tunnel cores sometimes are used for this purpose, also runners placed partly in the cope and partly in the drag. As a general rule the runner bar is in the cope. Additional slag traps are provided where for any reason the runner bar is in the drag. Instead of the usual round openings the gate or strainer cores are provided with a number of rectangular slots. Replying to a question from the floor the speaker stated that he preferred to pour metal into a sprue that was not directly above the slot core. Where a considerable amount of metal is poured directly on the strainer core, the sand has a tendency to disintegrate and flow with the metal into the mold, thus defeating the object of the skimmer or strainer core.

Feeding heads are placed as close as possible to the casting with a neck as large as is consistent with good practice for removal. Nearly all headers are countersunk and in the majority of instances are made in dry sand cores. Open headers usually are covered with an antipiping compound. Chills are avoided as much as possible. Several slides illustrated the fact that the same size feeders were used on castings varying considerably in size and weight.

Sand Controls Shrinkage

A statement by A. T. Jeffery, Dayton Malleable Iron Co., Dayton, O., that he could vary the amount of shrinkage in a malleable iron casting by accurate control of the sand condition, provoked considerable discussion. Over a period of years he has conducted an investigation on that subject. As an extreme instance he showed illustration of two 4½-inch ball castings. The metal from one ladle entered the mold through a small gate at the joint line. Each mold was provided with a 2½-inch diameter riser 5 inches high on the highest point. One casting containing coal dust in the facing sand had a pipe from the top of the riser to a point in the center of the casting. The second casting made under exactly similar conditions, but in plain sand, showed only a slight depression on top of the riser.

Before going into a detailed description of all the variables involved and the type of gate best suited to varying conditions, D. I. Dobson, General Malleable Corp., Waukesha, Wis., directed attention to the basic fact that in the gating of any malleable casting a good sound casting is the first consideration. After that, yield, flask size, and practicability of gate removal should be considered and weighed against each other where there is a choice of gating methods. By text and illustration he showed the application of several types of castings and of gating methods that proved

(*Continued on page* 168)

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THIS Master Blast is ideal for the mass cleaning of castings that do not require the intensive blast of the Sly Centri-Blast.

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(*Continued from page* 166)

effective.

A luncheon and roundtable discussion of current malleable foundry production problems, held Wednesday noon, was sponsored by the Malleable Division Roundtable Conference Committee. James H. Lansing presided, with A. M. Fulton, Northern Malleable Iron Co., St. Paul, and K. H. Hamblin, Grinnell Co., Providence, R. I., as co-chairmen. This meeting was followed by an afternoon session sponsored by the Malleable Division which included five papers and which was presided over by Mr. Fulton, with Fred L. Wolf, Ross Tacony Crucible Co., Philadelphia, as co-chairman.

Use of coining to produce malleable iron castings having a dimensional accuracy equal to that of machined surfaces was discussed in a paper prepared by C. C. Lawson, Wagner Malleable Iron Co., Decatur, Ill., and presented by H. W. Streeter of that company. While the author stated that results of the tests described were insufficient to draw many definite conclusions, it was demonstrated that coining is a simple and fast method of finishing two opposite sides of a casting with accuracy equal to milling or cutting.

Effects of the heavy pressure involved in coining on physical properties of the iron, according to the author's experiments, were to increase the tensile strength and hardness and to reduce the elongation of the coined pieces as compared with the metal in the as-cast condition.

Use Pulverized Fuel

Applications of pulverized coal firing to malleable iron annealing kilns were described in a paper by D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., and L. E. Wilcoxson, Babcock & Wilcox Co., Barberton, O., and presented by the latter. The direct-fired pulverizing system is relatively simple and eliminates the need for storage facilities. Where a number of units are to be fed, the circulating system has certain advantages in providing a continuous flow of fuel and air to the ovens with the pulverizer an integral part of the circuit. Data were presented to show cost savings from a pulverized coal circulating system in one malleable plant compared with hand firing. In later discussion it was brought out that annealing pot costs are about the same for pulverized and hand firing systems, temperatures being higher with the former but more heats being obtained before failure.

A method of supplanting rule-of-thumb procedure in choice and proportions of raw materials in malleable charges and in control of melting was described by M. E. McKinney, Hamilton Works, International Harvester Co., Hamilton, Ont. The procedure consists of two controls—one over the furnace charge, the other over powdered coal firing of the 20-ton furnace.

Employ Simple Method

Charges are figured mathematically by a simple method which takes into account the average loss in silicon and carbon from heats of the previous 6 days. It was pointed out that so long as the raw materials entering the charge are inspected carefully, the only elements that require attention during melting are carbon, silicon and, occasionally, manganese. With the desired analysis of the finished castings fixed and the changes in melting properly predicted, making up a charge sheet becomes merely a mathematical calculation. With accurate chemical analysis of charged materials and the resulting white iron, it is possible to arrive at any predetermined chemical compositions within limits set by variations inherent to any particular melting installation.

Operation of the furnace is controlled by a draft gage and a continuous indicator of the thermal conductivity type such as that used to check combustion on motor cars and principally to indicate the correct gas-air ratio in adjusting carburetors. The latter was adapted to regulate the coal-air ratio of the furnace. The draft gage checks presence of a slight pressure inside the furnace which is necessary to obtain a representative gas sample. When sample analyses of the heat are made, a calculating device termed the "addition computator" indicates quickly when a chemical determination should be checked, the choice and quantity of additions if any, and the required method of firing until the heat is tapped.

A method for testing quality of malleable iron comprised a paper by C. T. Eakin and H. W. Lownie, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and presented by the former. Development of this method was stimulated by the tendency to specify malleable iron for increasingly exacting applications, especially in heavy sections, and the importance of the quality of the metal in stressed sections of castings to be used for specialized applications. Since primary graphite, primary cementite and pearlite impair the properties of malleable iron, the quality test was designed to microexamine the castings for presence of these constituents and to rate them on the amounts contained. In most cases sampling for metallographic examination is done by use of a small core drill which does not impair the casting for its intended service.

The concluding paper, entitled "Rate of Spheroidization and Physical Properties of Pearlitic Malleable Iron After Isothermal Quenching," was prepared by W. H. Bruckner and J. Hino, University of Illinois, and was read by James H. Lansing. Data were presented for various specimens after spheroidization up to 68 hours. Tensile properties were shown to be best after 10 hours, accompanied by fair ductility.

FOUNDRY COSTS,

Renegotiation Studied

FOUNDRY costs and how they may be affected by renegotiation were considered at a session sponsored by the foundry cost committee, one of the concluding meetings on the four-day program. Chairman was R. L. Lee, Grede Foundries Inc., Milwaukee; with co-chairman E. W. Horlebein, Gibson & Kirk Co., Baltimore.

Featured speaker was Maj. Stephen B. Ives, chief, financial analysis section of the Renegotiation Division, Army Service Forces, Washington. He pointed out that one of the principal functions of the renegotiation of contracts is to

(*Continued on page* 171)

A wide variety of supplies and equipment was displayed by many firms

The loss of recoverable alloys in steel scrap has been a major problem confronting the various conservation agencies. Proper segregation of scrap is one effective answer.

Segregation of scrap at the source is comparatively simple. The difficulty comes in preventing mix-ups in subsequent handlings. They can be prevented or remedied by applying two simple tests—spark and spot.

The presence of molybdenum, or nickel, or both, is readily detected by spark testing. Molybdenum causes an easily recognized secondary burst at the end of the spark stream resembling a spearpoint. Nickel produces a spot of intensely white light in the stream near the grinding wheel.

Both elements have a tendency, in the higher contents, to suppress the supplemental bursts characteristic of carbon steels.

Several spot tests for molybdenum have been developed. The simpler ones depend on the red color produced by either potassium ethyl xanthogenate or sodium thiocyanate added to a molybdate obtained from the etched surface of the steel. The dimethyl glyoxime test for nickel also depends on a red coloration. Many of these tests are approximately quantitative.

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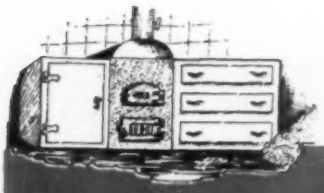

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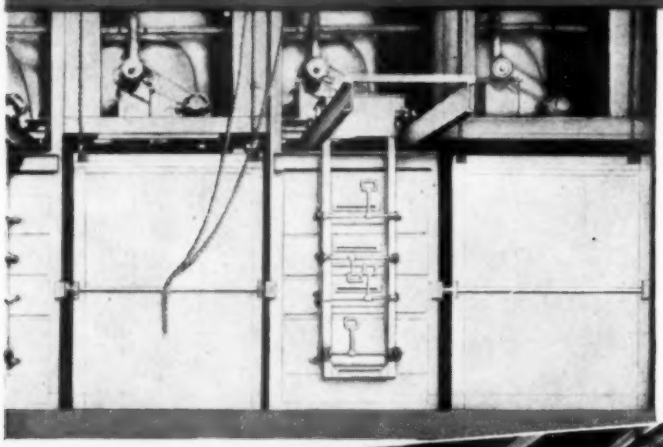

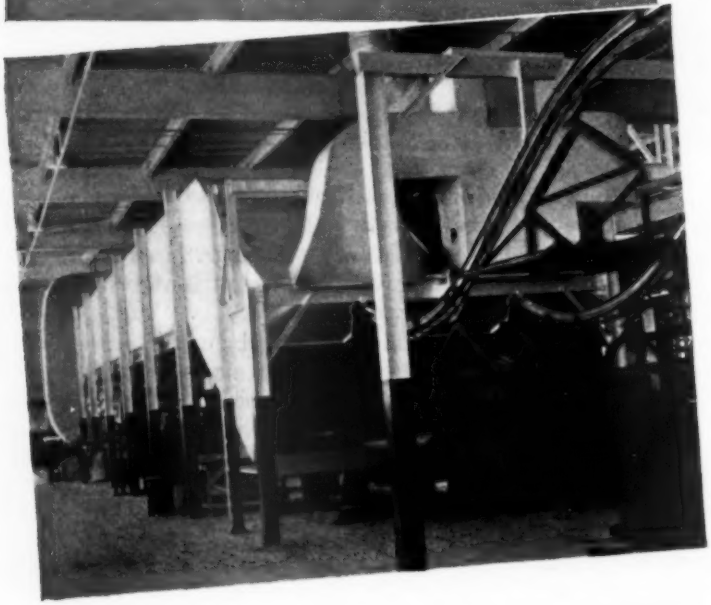

After V-Day, just as now, core quality and speed of production will be the chief factors in determining competitive standing. Whether Gray Iron, Magnesium or Aluminum, the future quality standard required of castings will demand better cores from which to make them. And core quality can be no better than the oven that bakes them.

ROSS Core Ovens, in a range of sizes and types for all requirements, are designed with the exclusive ROSS heating and circulating system that positively insures greater Uniformity, Elimination of Rejects, Increased Output in Less Time and in Less Space. The best proof of the remarkable performance of ROSS OVENS is the list of

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CONTROL OF AIR FOR MODERN INDUSTRY

(*Continued from page* 168)

reward those who look well to their costs in order to bring before industry in general the paramount necessity of so doing. Unit costs are currently being stressed, because it is rather easy to be careless about costs in a seller's market such as exists today, and particularly about the costs of subcontracted parts.

Major Ives observed that if a plant is not cost-conscious now and does not bend every effort to cut controllable costs to the bone, it will have an exceedingly difficult time when the postwar period of serious competition comes along, breaking the habits formed in wartime.

Much thought has been given to the possibility of saturation of markets and to postwar competition by the Integrated Renegotiation Committee on Foundries, made up predominantly of Ordnance Department members. It appears to be the conclusion of this committee that saturation will be present, particularly in those companies supplying the machine tool industry. Further, the keenest competition probably will exist among the steel foundries, due principally to the fact that a number of iron foundries now have steel casting departments, and to the fact that many steel casting plants have been built by the Defense Plant Corp.

The 1943 Renegotiation Act makes mandatory consideration of such factors as efficiency of the contractor, reasonableness of costs and profits, amount and source of public and private capital employed, etc. Summarizing, Major Ives said, "We hope to achieve much more uniformity in renegotiation proceedings."

NONFERROUS MELTING

Problems Are Stressed

WITH William Romanoff, H. Kramer & Co., Chicago, and George K. Dreher, Ampco Metal Inc., Milwaukee, presiding, brass and bronze foundrymen held an interesting discussion on cupola melting and test bar failures on Wednesday morning. Leighton M. Long, Leighton M. Long & Associates, Toledo, described procedure for melting nonferrous metals in the cupola. The cupola used is lined to 26 inches with a silicon carbide lining composed of blocks, or more preferably a monolithic lining of silicon carbide cement extending from the bottom to 28 inches above the tuyeres. Pitch coke is used for fuel and the maximum air flow is 700 cubic feet per minute at four ounces pressure. Four tuyeres each with an area of 6 square inches are located 16 inches above the bottom.

Bed extends 36 inches above the tuyeres and is incandescent before metal is charged. Metal charges range from 400 to 450 pounds with coke splits in the ratio of 1 to 20. Melting rate should not be less than 2500 pounds per hour. Metal to be melted should be clean and no slag forming materials are used. A 400-pound charge can be melted in 12 to 14 minutes. Volatilization losses are as follows: Copper, none; tin, negligible; lead (10 per cent alloy)—15 per cent, (10 to 15 per cent alloy)—20 per cent, (15 to 30 per cent alloy)—25 per cent; zinc (to 3 per cent alloy)—50 per cent, (3 to 6 per cent alloy)—60 per cent.

In a written discussion, A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee, called attention to the high lead and zinc losses which would necessitate a high stack to carry the fumes high into the atmosphere, or use of a scrubber to remove the fume in certain neighborhoods. He also said that aluminum containing alloys may cause bridging in the cupola, due to formation of a viscous slag. He pointed out that in a 36-inch cupola 1500-pound copper charges were melted with 150-pound coke splits. Tin, zinc and lead were added in the ladle. Harold J. Roast, Canadian Bronze Co. Ltd., Montreal, said that he believed cupola melting would provide metal of uniform composition when operations were conducted properly, and that charges could be all gates, scrap castings or ingots, or combinations. He said he also believed that copper-silicon alloy could be melted in the cupola.

W. B. George, R. Lavin & Sons, Chicago, presented a paper on some causes of test bar failures. Dealing with the Navy G and M compositions he pointed out that test bar failures may be due to a number of causes, and constant care is needed to insure success. Some of the causes are water vapor or moisture, overheating in reducing or oxidizing atmospheres, incorrect temperature in pouring, use of wet sand and too hard ramming, additions of phosphorus and zinc at the wrong time, and in proper use of charcoal. Mr. George illustrated various defects attributable to different causes by sketches of the bar appearance so that they could be identified more easily when they occurred. He also explained an investigation conducted on test bars cast to size.

In the discussion which followed Mr. George, in response to a question on strained test bars, said that stress relief treatment gave 5 per cent higher properties; also that cast to size bars showed 10 per cent higher properties than when the skin was removed by machining. He also believes that when metal is transferred from crucible to pouring ladle, it may not be as good as in the crucible if the lining material is of poor quality, or it is not perfectly dry. Harold J. Roast said in his opinion the keel block test bar gave the most reliable results on properties and quality of the metal. Since the bars obtained from the block were up to 1¼-inch square they would indicate quality of metal in castings with sections that thick, which was not possible with the ordinary cast to size test bar.

Second session on brass and bronze foundry problems was held Wednesday afternoon. C. O. Thieme, H. Kramer & Co., Chicago, and Leighton Long, were chairmen, and the discussion was concerned with gasses and porosity, use of cartridge brass, and effect of antimony in copper-base alloys. First paper presented by H. L. Smith, Federated Metals Division, American Smelting & Refining Co., Barber, N. J., pointed out that trouble from gassy metal may result from a number of reactions during melting, which ordinarily might not be considered as having any effect. For example copper will dissolve carbon which combines with oxygen to form carbon monoxide. The latter is absorbed by the molten metal.

Likewise water vapor in the furnace atmosphere is dissociated by the high temperature into its component parts, hydrogen and oxygen. The hydrogen is absorbed by the metal while the oxygen unites with zinc, tin and lead to form oxides of those metals. Localized superheating or overheating of nonferrous alloys may result in trouble such as porosity. Mr. Smith cited an example where excellent results had been obtained with the method of charging in crucible furnaces which consisted of placing the heavy materials, such as ingot and scrap, in the center, and borings, etc. on the outside. However, with induction melting severe cases of porosity developed, and investigation showed that the effective heating zone was developed in a layer extending 2 or 3 inches from the wall of the crucible. The borings melted rapidly, and temperature of the small amount of metal reached as high as 2800 to 3000 degrees Fahr. while dissolving the heavier materials. Change of practice in placing the heavy material on the outside of the crucible with the borings, etc. in the center eliminated the trouble.

Hydrogen May Remain

In response to use of phosphorus as a deoxidizer, Mr. Smith pointed out that phosphorus was quite effective in removing oxygen, but had no effect on hydrogen. Hence, where dissociation of water vapor was the cause of oxidation, difficulty with the metal could not be overcome completely by use of phosphor-copper or tin since it removed only part of the cause.

In a second paper prepared by Dr. B. M. Loring, Naval Research Laboratory, Washington, and presented by Ensign J. F. Robertson, U. S. N., it was pointed out that one of the difficulties encountered in using fired cartridge brasses as a component of nonferrous ingot and castings was the antimony and lead contents left by the primer. Those could not be removed by pickling or other means, and hence, entered the molten metal. Main interest of the investigation for utilization of the cartridge brass was for production

(*Continued on page* 174)

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Velsicol Resin-type Core Oil produces cores with exceptionally good collapsibility resulting in clean shakeout—

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The use of Velsicol gives desired core strength for all types of metals at reduced core room costs—

(*Continued from page* 171)

of manganese bronze, and the author showed in numerous charts of physical properties obtained from bronzes in which such brass was used, that as long as the antimony content did not exceed 0.05 per cent, specifications for elongation and tensile strength could be met easily.

In the discussion Carl Thieme said that there was no doubt that manganese bronze made with fired cartridge cases would meet the ordinary 65,000 pounds per square inch tensile strength figure, but for the higher tensile or superstrength manganese bronze, difficulty was encountered in obtaining uniform results in physical properties.

Final paper at the session was entitled, "Effect of High Antimony Content in Tin Used in Making Bronze Alloys," by C. A. Reichelderfer, Bruce W. Gonzer, and J. M. Blalock, Battelle Memorial Institute, Columbus, O. The paper was presented by Mr. Reichelderfer and related to use of tin from Bolivia of which some grades were quite high in antimony content. Investigation of a number of common tin-bearing copper-base alloys indicated that antimony caused decrease of elongation values, but that in general use of Bolivian tins still gave elongations which would meet specifications of the Army and Navy. Mr. Reichelderfer also mentioned that improvements in tin refining had resulted in further reduction of antimony content so that present likelihood of trouble from that source was small.

Nearly 200 were present at the round-table luncheon arranged for a discussion of brass and bronze foundry problems which was held at the Statler hotel on Thursday. B. A. Miller, Cramp Brass & Iron Foundries Division, Baldwin Locomotive Works, Philadelphia, was chairman, and William Romanoff was co-chairman. Discussion following the luncheon mainly was confined to melting, and various phases of the subject were outlined by a panel of experts including Fred L. Wolf, Ross-Tacony Crucible Co., Philadelphia, who spoke on melting in crucible furnaces; Leighton M. Long, who explained cupola melting of brass and bronze; Harry M. St. John, Crane Co., Chicago, who described procedure for arc type electric furnaces; Henry Gieseke, Ajax Electric Furnace Corp., Philadelphia, who discussed melting in low-frequency induction furnaces, and Frank T. Chestnut, Ajax Electrothermic Corp., Trenton, N. J., who described melting brass and bronze in high-frequency induction furnaces. Following the various speakers R. W. Parsons, Ohio Brass Co., Mansfield, O., presented a summary of the high points brought out.

STEEL GROUP STUDIES

Sand and Heat Treatment

VARIOUS problems connected with steel foundry practice were discussed at several sessions. D. L. Parker, General Electric Co., Everett, Mass., presided at the Wednesday session where three papers were presented dealing with the sand question, particularly in its application to molds and cores in the steel foundry. The first paper was prepared by R. E. Morey and H. F. Taylor, Naval Research Laboratory, Washington and was presented by Mr. Morey. It covered an extensive series of experiments designed to provide a cumulative curve in foundry sand control. Despite the apparent complexity of the subject, the authors claimed it might be mastered in a comparatively short time and would provide the investigator with a reliable guide in evaluating any sand in the particular application of steel casting production. Sands from various localities vary to a considerable extent, but by following the instructions developed by the authors of the paper, practically any sand can be manipulated to serve as a suitable molding medium. The paper was illustrated by an elaborate series of charts.

The second paper prepared by H. W. Dietert, R. L. Doelman and R. W. Bennett, Harry W. Dietert Co., Detroit, and dealing with mold surface properties at elevated temperatures, was presented by Mr. Dietert. Popularity of the speaker and confidence in his opinions was indicated by a question and answer period that exceeded the time actually consumed in the formal presentation of the paper. The authors described tests performed to obtain information concerning the elevated temperature properties of mold surfaces, spalling, confined expansion, hot strength and hot deformation. Data obtained were presented graphically, to cover ramability, flowability, liftability and toolability. Each of these features was covered in considerable detail.

The following conclusions may be drawn: Spalling tests furnish a practical means of determining the thermal stability of sand mixtures; the confined expansion test is better than the free expansion test; the confined expansion test furnishes data necessary to basic knowledge; materials such as silica flour, sea coal, core oil and cereal binders reduce confined expansion; additions of bentonite clay and other binders to silica sand reduce the confined expansion of the base sand; lowering the flowability reduces confined expansion; when the mold surface of green sand is subjected to heat, a hot strength some 10 times greater than the green strength is produced within the first minute; addition of silica flour to green sand materially increases this quick hot strength; with dry sand, the dry strength quickly is reduced to a point much lower in value than the dry strength; with continued heating the dry sand develops increasing values for hot strength property.

A third paper prepared by John A. Rassenfoss, American Steel Foundries, East Chicago, Ind., covered a detailed study of the accuracy with which elevated temperature compression strength results can be reproduced at a single laboratory and between different plant laboratories. Five different sand mixes were made in triplicate at a single laboratory and tested at 2500 degrees Fahr. Results obtained for single batches in a series deviated from the average of the three batches made per series by 15 per cent or less. Similar elevated temperature tests performed by four different plant laboratories on specimens from the same mixes were erratic, deviating from the average of results obtained by 20 to 40 per cent.

Discuss Heat Treatment

Four papers dealing with the hardenability and heat treatment of steel castings, also a progress report of the committee on heat treatment of steel castings, were presented at a steel session Thursday under the chairmanship of C. H. Lorig, Battelle Memorial Institute, Columbus, O. Capacity audiences featured practically all meetings, but the fact that this meeting with the program based on extended series of graphs and charts, also drew a capacity crowd, would seem to indicate that the old rule of thumb foundry era definitely is a thing of the past. Vigorous discussion which followed the presentation of each paper showed a familiarity with the subject equal to that of the speaker. The true scientific spirit which—without proof—accepts nothing that is heard and very little that is seen, prompted many of the comments.

In the introduction of his paper "Hardenability of Some Cast Steels," J. B. Caine, Sawbrook Steel Casting Co., Lockland, O., stated that although the term hardenability is new, the property in steel that it measures is as old as the art of steel making. This property formerly was an unknown quality that defied control by ordinary chemical analysis, or by temperature control. Although a fine grain steel is tougher than a coarse grain steel, this fact is not sufficient to explain the great difference in toughness. However, if the sample bars are sectioned and a hardness survey made through the sections, the reason for the difference becomes clear. The speaker elaborated this feature by a number of lanternslides. He then discussed the fundamentals of why steel hardens when heated and quenched and the reasons for the adoption of a new test to measure hardenability. Several examples were shown of results checked with those obtained theoretically from the chemical analysis.

Gordon W. Johnson, American Hoist & Derrick Co., St. Paul, Minn., in presenting his paper "Problems Encountered in Making and Heat Treating Castings of an Air Hardening Steel," directed attention to the fact that steel castings which must be hardened throughout with minimum distortion after machining, pre-

(*Continued on page* 176)

Dings

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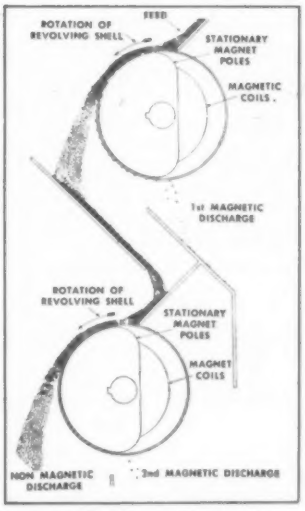

The illustration above, left, shows a Dings Double Drum Separator purifying aluminum turnings at the East Chicago, Indiana, plant of U. S. Reduction Company. Diagrammatic sketch of operation shown at right.

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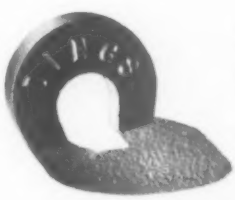

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(*Continued from page* 174)

sent many problems in foundry practice and heat treatment. Requirement of hardness throughout eliminates the possible use of carburizing grades of steel. Medium alloy, oil hardening grades are subject to distortion and quenching cracks. In such cases a high alloy air hardening steel is the answer. For this purpose a chromium-nickel-molybdenum grade having the following representative analysis has been found satisfactory: Carbon 0.55 per cent, manganese 0.70 per cent, chromium 0.75 per cent, nickel 1.50 per cent, molybdenum 0.50 per cent.

Additional papers on phases of the same general subject were presented by J. H. Richards, Naval Research Laboratory, Washington, and C. T. Greenidge, Battelle Memorial Institute, Columbus, O. In the preparation of his paper "Hardenability and the Steel Casting," J. H. Richards collaborated with K. L. Clark. The paper "The Effect of Copper in Some NE and Low Alloy Cast Steels," was the joint product of C. T. Greenidge, M. C. Udy and K. Grube.

Study Copper Effect

Studies of the effect of copper in steel castings were presented in a paper by H. F. Bishop, Naval Research Laboratory, Washington, which outlined research done by Mr. Bishop and H. F. Taylor, also of the Naval Research Laboratory. The work confirmed the findings of a study at Battelle Memorial Institute in regards to the effects of copper additions. Between 1 and 2 per cent copper increases yield point and tensile strength about 20,000 pounds per square inch. It also increases corrosion resistance, weldability, machinability, and hardenability. The amount of copper to be added is solely a function of the carbon content to reach a given physical. In fact it may be said that more copper content requires less carbon content to duplicate the required physical properties. Lee C. Wilson, Reading Steel Casting Division was chairman and T. N. Armstrong, International Nickel Co., New York, was co-chairman and presided.

Dr. C. H. Lorig, Battelle Memorial Institute, in discussing this paper, said the results they had obtained at Battelle compared favorably with the findings at Naval Research Laboratory. He also pointed out that as the carbon content of the steel increases, the effect of copper decreases. Copper additions less than 0.5 per cent make no appreciable change in the physical properties of an iron, while additions above 4 per cent show little tendency to change physical properties.

The difficult problem of eliminating bore cracks, which are circumferential cracks on the internal surface of cylindrical castings, such as valves and fittings, was accomplished at the Boston Navy Yard through the use of a special low carbon steel. This development was described by C. J. Lutts, co-author with J. P. Hickey of a paper on the subject. In one case he cited that a steel containing 0.50 molybdenum was dropped from 0.22 to 0.12 carbon, while the manganese content was increased from 0.55 to 1.06 in order to maintain the tensile strength of the iron at 75,000 pounds per square inch. Flanges, valves and fittings made from this special steel showed substantial decrease in defective units.

Notes on recent steel casting developments at Norfolk Navy Yard, Portsmouth, Va., were given by S. W. Brinson, a presentation prepared by Mr. Brinson and J. A. Duma of the Norfolk Navy Yard. A large number of difficult Navy castings were shown with defects and case studies were indicated on how these defects were eliminated. Ensign R. C. Wayne, co-author with H. F. Bishop of a research on new types of test bar molds in the Naval Research Laboratory, Washington, described six new designs of test bars which have been undergoing thorough investigation. According to the speaker, even a minute amount of shrinkage in test bars can throw off elongation tests so it is imperative that the bars be perfect. However, it has been discovered that it is not necessary to produce a large ferrostatic head to get results in test bars. Blind risers, coupled with atmospheric pressure, can do the job just as well. Using this method, the saving in metal is as much as 80 per cent. The new test bar designs include several new cluster types with which as many as a dozen bars can be tested at once in more or less conventional design, as well as some new single test bars of new design which show considerable promise in interpreting results of tests.

New Triplex Process

In a short but important report of the committee, on methods of producing steel for castings, C. E. Sims, Battelle Memorial Institute, Columbus, O., stated while there has been no radical advance in steel casting practice for the past year, several interesting things have been learned. He cited, for example, that a new triplex process has been developed which melts steel in the cupola, moves to a rotary furnace where it is superheated and then to a side blow converter for finishing. The conventional triplex process using a cupola, a converter and an electric furnace has proven to be more expensive than expected. It has proved more costly than conventional melting methods and there is as yet no indication that the new triplex process eliminating the electrical furnace will be much more economical. Dr. Sims also stated that research during the past year has showed definitely that high aluminum additions to steel has proved useless and in some cases has possibly contributed to intergranular weakness.

As with practically every activity connected with the Buffalo convention, the round table luncheon sponsored by the Steel Division Round Table Conference Committee in the Hotel Statler Georgian room Friday noon, drew a crowd in excess of the seating capacity of the meeting room. Tom D. West, West Steel Casting Co., Cleveland, presided over the meeting, assisted by R. S. Munson, Atlantic Steel Castings Co., Chester, Pa., as vice chairman. Several topics of general interest to the steel foundry industry were discussed informally under the direction of G. A. Lilliequist, American Steel Foundries, East Chicago, Ill., and John Howe Hall, General Steel Castings Corp., Eddystone, Pa.

REFRACTORIES USE

In Ladles Discussed

VARIOUS types of refractories and their applications in the foundry industry were outlined in a comprehensive paper delivered by G. W. Paterson, Canadian Refractories Ltd., Montreal, on Tuesday afternoon. Moving through the lightweight and low temperature refractories, Mr. Paterson covered the range up to and including silica brick. E. J. Carmody, C. C. Kawin Co., Chicago, was chairman.

Considerable portion of the paper was devoted to insulating firebrick, how they are made and their application in furnace and oven walls, roofs and floors both alone and in combination with plastic refractories of various types. Of particular interest among the foundry applications were hot blast cupolas, pits for stress relieving, and core drying ovens. In the latter category satisfactory results have been obtained with a furnace consisting of a 3-inch wall of plastic refractory in a steel shell.

Research on the problems of baking and preheating ladle linings has been carried on extensively by C. E. Bales, Ironton Firebrick Co., Ironton, O. In a report on this research all sorts of casting defects were traced to ladle boils caused by green ladles and the attendant moisture. In addition, the damp ladles cut out faster and therefore have shorter life.

Method to be used in drying the ladle varies widely, and depends on the size of the ladle as well as the refractories used the lining. Many different types of refractories are used, according to a survey of thousands of foundries conducted in connection with this research, and each type of refractory requires a different practice. One of the most important functions of the preheat is to saturate the refractories in the ladle and prevent chilling the metal. Length of heating time is a function of wall thickness, and it is recommended that shells be perforated on 1, 2 or 3-inch centers depending on the size of the ladle. Drying in core ovens where possible has been found acceptable practice.

Using a bottom pour practice with ladles as small as 100 pounds capacity was described in a training film presented by S. E. McGinty, Firegan Sales Co., Chicago. Devoting most of its footage to the preparation of the stopper, stopper rod and ladle bottom, the film demonstrated bottom pouring of castings from these small ladles with the resultant ab-

(*Continued on page* 179)

BENTONITE

IN FOUNDRIES

the great change in molding sand practice of this generation has been the swing to the use of bentonite as a binder.

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Selection, blending and mechanical preparation. Many formulas for steel, iron and magnesium sands. 48 pages.

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(*Continued from page* 176)

sence of slag. Metal is held in a large holding ladle and poured out in about 100 pound lots into the small bottom pour units. It is possible to empty the small ladles entirely in the operation, but practice generally has been to leave about an inch of metal in the bottom, according to Mr. McGinty.

Monolithic rammed-type linings seem to function best in the side blow converter, according to results of a research sponsored by Whiting Corp., Harvey, Ill., and the Armour Research Foundation, Chicago. In a report presented by W. C. Cress of the foundation, the monolithic linings often are the only type which can be installed easily in small converters without a considerable amount of excess labor cost. Ganister with 6 per cent bentonite has proved the most efficient mix in the series thus far tried. Use of the bessemer eye, developed by Jones & Laughlin Steel Corp. and now applied to side blow converters as well, aids in refractory life, according to the speaker. This electronic control catches the end point quicker than the human eye and thus minimizes the formation of FeO, which attacks refractories.

SAFETY AND HYGIENE

Session Considers Equipment

BETTER co-operation is needed between the user and the manufacturer of equipment intended to aid the safety and health of foundry workers, it was asserted by James R. Allan, International Harvester Co., Chicago, at the meeting sponsored by the Industrial Hygiene Codes Committee. Mr. Allan, who is general chairman of that committee, presided at the session.

In his remarks on industrial safety and occupational disease control Mr. Allan stated that in certain instances equipment vendors have taken advantage of the increased demand for plant facilities and have manufactured and sold equipment without regard for safety and health protection features. Some manufacturers who have entered the equipment field lately have no knowledge of or experience in designing equipment that can be operated safely. For instance, some have started to build so-called unit type air filters or dust collectors that recirculate exhausted air back into the breathing zone of workers—and yet various state laws strictly prohibit such recirculation of air. In certain instances manufacturers of emery wheel grinding equipment have wasted a great deal of material in designing safety and ventilating hoods that do not meet code requirements and must be replaced.

Discuss State Code

Mr. Allan urged New York state foundries to appeal for the elimination of the so-called safe toxic limits from the code which became effective in that state Feb. 1. One provision of the code is that the amount of dust in the breathing zone of an employe shall not exceed 30 million particles per cubic foot of air in any foundry operation, except that in abrasive blast cleaning rooms concentration shall not exceed 10 million particles inside the helmet or respirator worn by the operator. The code also provides a number of engineering rules for the control and elimination of dust at its source of origin, and because of the incompatibility of the two requirements there is fear of a complete breakdown of code rules for the state. The speaker stated that his committee has opposed dust counts in any state code, because experience has shown that the most satisfactory way to improve working conditions is to adhere to sound, reasonable engineering rules.

Results of various studies of the toxicity of fumes generated by electric melting furnaces were described in a paper on that subject by J. William Fehnel, Industrial Hygiene Laboratory, Metropolitan Life Insurance Co., New York. In general, no conclusive evidence was found of the harmfulness of the fumes given off in electric furnace production of ferroalloys and steels, with the exception of those in the production of ferromanganese.

There is insufficient x-ray evidence available to determine the toxicity of the amorphous silica fumes. However, animal injection shows that caution should be exercised in exposing workers to heavy concentrations for long periods. There are conditions when the concentration of carbon monoxide may become hazardous for continuous exposure, and concentrations which may cause headaches often are present at elevated points. The highest concentrations naturally are found at locations above the operating floor where the fewest number of men are working. If the generated dusts should be classified as inert, the concentrations found are too high for continuous exposures as prescribed by code in some states.

Application of ventilating hoods to electric melting furnaces was described by John M. Kane, American Air Filter Co. Inc., Louisville, Ky. The installation illustrated was a pancake type which fits over the furnace roof and moves with it when the roof is lifted for charging. A special type of joint permits the exhaust duct to remain stationary when the roof is removed, at the same time providing a close fit between the hood and duct when the furnace is operating. The hood does not affect the furnace temperature, since the high thermal efficiency of the modern electric furnace usually holds the temperature just above the roof at a relatively low level.

Need for some type of smoke and dust removal from the immediate areas about electric furnaces has been demonstrated even in the newer plants, particularly when the charge first starts to melt down. One difficulty has been that the natural heat in the created gases is insufficient to cause their ready removal through natural draft exhausts. Also, the increasing number of mechanical exhaust systems installed in other departments of foundries sometimes has a tendency for air to be drawn in rather than out of natural draft exhausts, thereby retarding the removal of smoke and fumes created at the electric furnaces and causing them to drift through the plant.

The concluding discussion, by Warren Cook, Zurich Insurance Co., Chicago, covered recent developments in control of occupational diseases and hazards in foundries. To guard against x-ray burns Mr. Cook recommended that tests be made both at the time the equipment is installed and also during subsequent operation in order to be certain that no stray radiation which would cause damaging exposure occurs. Proper shielding should be provided for portable equipment. Similar precautions are necessary in use of radium.

Have Toxic Effect

Styrene, used in impregnation of magnesium castings, has been found to be a hazard if present in the atmosphere in concentrated form, although normally it causes sufficient irritation to indicate its danger before actual stomach poisoning occurs. Carbon tetrachloride, when used as a core wash, can become poisonous through developing phosgene gas when cores so treated are baked. Certain metals which have given trouble lately include cadmium and tellurium. Cadmium poisoning has resulted from exposure to fumes created when the metal is heated, while the principal ill effect from proximity to tellurium fumes seems to be their ability to give a persistent garlic odor to the breath of the person affected.

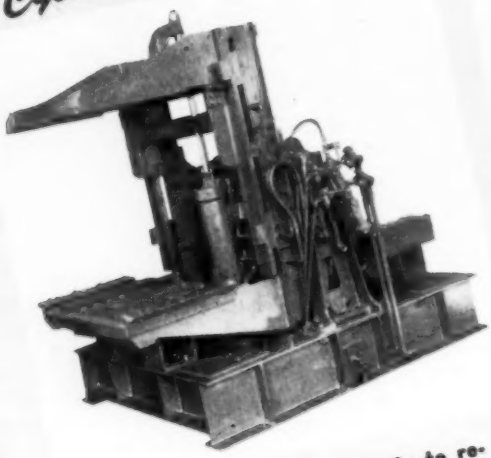
Pointing out that incidence of foundry workers to pneumonia is relatively high, Mr. Cook stated that this condition could be at least partially corrected by attention to the clothes worn by operators who persist in cooling themselves too rapidly after exposure to high temperatures. Another step to reduce discomfort to workers is to provide means for removing core fumes both at the baking ovens and at the molds when poured.

High silicosis incidence has been found where reclaimed sand drops into storage tanks. Few workers are occupied at such spots, but they should wear respirators and an exhaust should be provided.

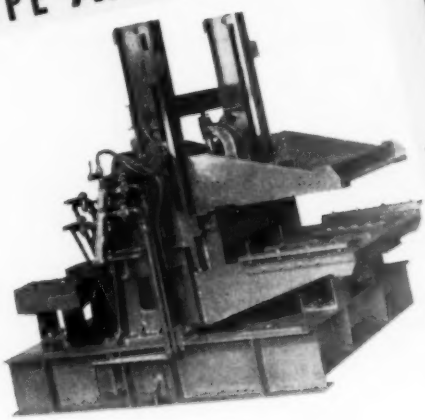
The speaker stated that three-fourths of the foundries visited recently showed an active interest in dust control and were providing or had provided means for preventing dusty working conditions. The remaining plants appear complacent as a result of the lack of silicosis claims and

(*Continued on page* 182)

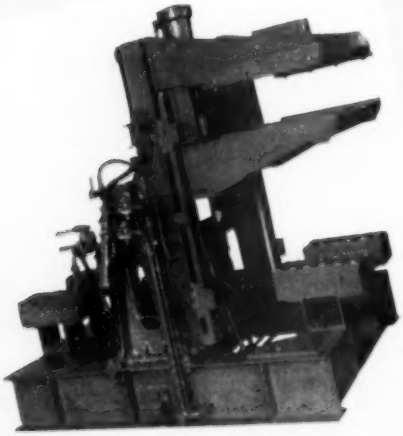
Cycle of INTERNATIONAL TYPE AN MACHINE



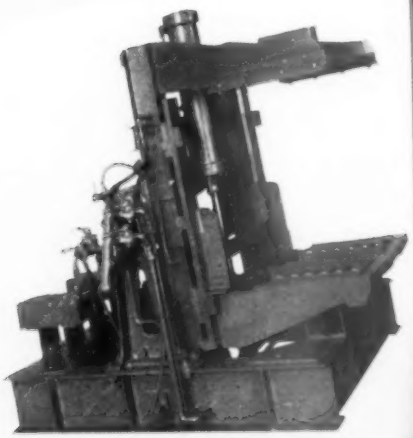
The machine is shown ready to receive the core box after it has been rammed.



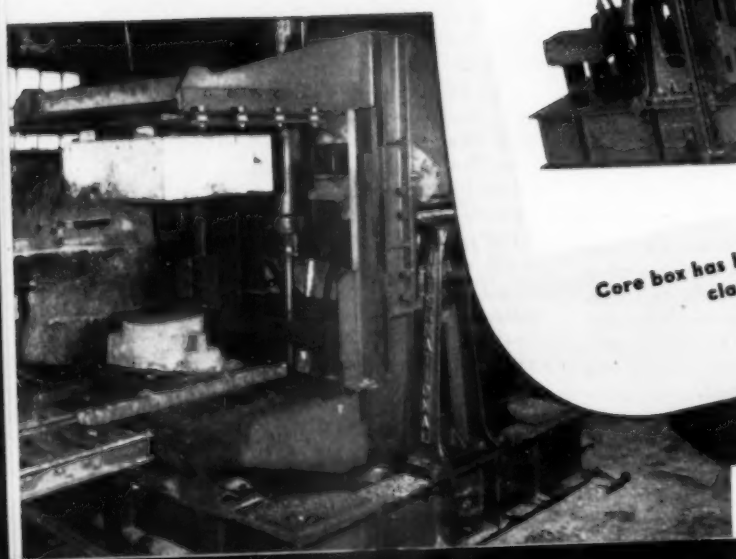
The draw frame has been moved into the position of clamping the core box and core plate.



Core box has been rolled over in the clamp position.



The core and core plate have been drawn from the core box.



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(*Continued from page* 179)
are inclined to do little about dust control. However, Mr. Cook pointed out that good times tend to induce workers to disregard silicosis trouble, and he warned that an influx of damage claims may develop later when jobs are less plentiful. Consequently, the foresighted foundry should take steps now to protect itself against future trouble.

ALUMINUM AND MAGNESIUM

Sessions Attract Interest

FIRST of three sessions on aluminum and magnesium sponsored by the Aluminum and Magnesium Division of the A.F.A. was held Tuesday afternoon. Continuing interest in the subject of light alloys was indicated by the excellent attendance at the meeting, which was under the direction of Dr. N. E. Woldman, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., and Wayne E. Martin, Sperry Gyroscope Co. Inc., Flushing, N. Y. Papers presented discussed effect of alloying elements on aluminum, a new aluminum alloy for sand casting, and micro-radiography.

First paper was presented by Walter Bonsack, National Smelting Co., Cleveland, who stated that the effect of small amounts of various alloying elements on aluminum was of interest not only to the foundryman but to the engineer. The former was interested in the effect on the molding and melting characteristics, and the engineer on the effects on physical properties.

Additions Change Proper Ties

Mr. Bonsack pointed out that with pure aluminum, iron and silicon should be in the ratio of approximately 1.0 to 1.8 to prevent hot shortness and low conductivity. In the 4 per cent copper, 2 per cent silicon (195) alloy, addition of titanium increases strength and elongation while addition of manganese increases tensile strength to some extent. In the aluminum-magnesium-zinc alloy, iron up to 2 per cent increases yield strength, tensile strength, and hardness, and decreases elongation. Increase in silicon increases hardness, decreases elongation, with a slight increase in tensile strength. Small chromium additions cause a slight decrease in hardness, and as more is added an increase in that characteristic results. Chromium in combination with manganese increases yield strength and tensile strength; the elongation varying with the type of heat treatment. In aluminum-silicon alloys, iron causes formations of needle-like components which are undesirable. However, that type of structure can be modified considerably by addition of sodium, and more particularly if titanium and manganese also are used in conjunction with sodium.

In the discussion which followed it was stated that over 0.5 per cent iron caused the formation of the needle-like or acicular structure. Grain refining elements include a wide range such as sodium and titanium for aluminum-silicon alloys only; for other alloys boron, beryllium, zirconium, vanadium, etc., may be used. Boron is a good grain refiner if the proper addition can be determined. Sodium is a rather elusive element to determine in aluminum alloys, and hence, it is hard to make a study of the effect of varying amounts. Titanium used in alloys with very little eutectic structure carries through the remelting several times. Preferable time of adding the element is just before pouring. One member said his practice was to add 0.2 per cent titanium to an aluminum-copper-nickel(Y) alloy just before pouring and it was quite effective on refining grain size.

Second paper presented by Hiram Brown, Frontier Bronze Corp., Niagara Falls, N. Y., described the physical properties and characteristics of a recently developed aluminum alloy containing about 5.25 per cent zinc, 0.55 per cent magnesium, 0.4 to 0.6 per cent chromium and 0.15 to 0.25 per cent titanium which possesses high tensile strength after aging with previous heat treatment. Minimum tensile strength of the alloy was given as 32,000 pounds per square inch, and the yield strength as 22,000 pounds per square inch. In response to a question on castability, Mr. Brown said it was not quite as good as with aluminum-silicon alloys, but about the same as for the 4 per cent copper-2 per cent silicon alloy. Pouring temperature should be about 30 degrees higher than for aluminum-silicon alloys. Dimensional stability of the alloy was reported to be excellent.

Use Microscopic Technique

Final paper was on micro-radiography as a control tool in the foundry, and was prepared by L. W. Ball, Triplett & Barton Inc., Burbank, Calif. Procedure consists of x-raying thin slices of metal from 0.005 to 0.05-inch thick and then examining the resulting negative at the desired point under the microscope at 2 to 200 diameters. Such examination determined whether the defect, as shown by the x-ray film, resulted from gases, shrinkage, too slow cooling, absence of refining agents, etc. In magnesium alloys one could distinguish between oxides resulting from burning the metal, and microshrinkage. Important advantage of the method is that large areas can be studied quickly from specimens which can be prepared rapidly. The specimens are taken with a thin abrasive cut-off wheel, and used without any further preparation.

At a Wednesday session, the annual exchange paper of the Institute of British Foundrymen, prepared by John Vickers, foundry manager Rolls-Royce, Ltd., and titled "The Mechanized Production of Aluminum Gravity Die Castings" was presented by J. W. Wheeler, Rolls-Royce Ltd., Derby, England. R. E. Ward, Bendix Aviation Corp., Teterboro, N. J., was chairman of the meeting. The speaker stated that speaking broadly of the aluminum alloy castings on the liquid cooled aero engines produced by Rolls-Royce, experience invariably has shown that where a part could be produced as a gravity die casting, or as it is known in the United States, permanent mold casting, many advantages were possible over sand castings. Principal advantages include: Smoother finish and closer dimensional accuracy, greater possible speed of production, conservation of raw materials, reduction of production scrap, improved mechanical properties in the casting. Of the 130 castings on the Merlin engine as produced by Rolls-Royce, 103 or nearly 80 per cent are produced by the gravity die method. Out of this number only 9, or 8.7 per cent have their internal passages formed by sand cores.

Close Control Employed

After each die mold is completed in the tool room and has passed a thorough and critical inspection it is passed on to the experimental foundry where it is tested in actual practice. As a result of this testing the most suitable technique is developed for production including: Die coating and application, pouring temperature of the metal, die temperature, method of pouring and production time cycle. These are firmly established and recorded for the use and information of the production foundry.

One sample casting is passed to the inspection department for marking up to the drawing and thereby checking dimensional accuracy. A radiological examination is carried out on a further sample or samples to ascertain any defects not visible to the naked eye, internal porosity, shrinkage, blowholes, etc. Upon receipt of a satisfactory report, the final production conditions are tabulated as a form of standard layout to which a trial batch of at least 100 castings is produced with not more than 5 per cent rejects.

Photos and text in the first part of the paper described in intimate detail construction and operation of the dies. The second part of the paper described production and inspection methods, also a description of the foundry layout illustrating to what extent mechanization has been introduced to obtain maximum output. A table near the end of the paper showed the composition and physical properties of six alloys in general use. Of these, alloy R.R.50 is a most suitable material for general sand and die castings of the structural type where rigidity and strength are required. It possesses excellent castability, particularly when running intricately cored cast-

(*Continued on page* 184)

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(*Continued from page* 182)

ings of widely varying metal section. It machines freely, especially when heat treated, has good bearing properties and the titanium content acts as a refining agent. Analysis shows: Copper 0.80 to 2.00 per cent, nickel 0.80 to 1.75 per cent, magnesium 0.05 to 0.30 per cent, iron 0.80 to 1.40 per cent, titanium 0.50 to 0.25 per cent, silicon 1.50 to 2.80 per cent, aluminum, remainder.

A paper on the apparatus and method of measuring relative permeability in dense mold materials was presented by John Neff, Research Department, U. S. Gypsum Co., Chicago.

With Louis Brown, Magnesium Fabricators Division, Bohn Aluminum & Brass Corp., Adrian, Mich., presiding, the final session sponsored by the Aluminum and Magnesium Division of the A.F.A. was held on Thursday afternoon. Meeting was opened with a paper presented by S. U. Siena, Sperry Gyroscope Co., Brooklyn, N.Y., on "Die Casting of Aluminum Alloys by the Cold Chamber Process" in which it was stated that with the cold chamber or high pressure die casting different alloys are required. Present alloys include one with 9 per cent silicon and 3½ per cent copper; another containing 10 per cent silicon and 0.5 per cent magnesium, and a third containing 8 per cent magnesium gives the highest combination of strength and ductility with sacrifice of some castability.

Mr. Siena said that if possible die castings should be designed with the parting line in one plane, and undercuts should be eliminated where possible. Design should be made with dimensional tolerances of plus or minus 0.0025-inch for first inch and plus or minus 0.0015-inch for each additional inch. Dies must be vented properly to permit escape of air, and the best grades of heat resistant steel must be used. An important feature of die design is inclusion of overflow at the point farthest from the gate into which the first metal flows and is pocketed.

In response to a question on degasification of the alloy, Mr. Siena said that not a great deal had been done along that line except to keep the metal in the pot without disturbance. He had no experience with degasification in the pot. As to losses he stated that considering all factors the loss was about 7 per cent. He said he believed porosity in die castings mainly was due to entrapped air, but that some of it may be due to faulty lubrication of the dies.

Second paper on the program was presented by Robert E. Ward, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., and described procedures for obtaining better light alloy castings for aircraft. Those include radiographic inspection; co-operation between designer, patternmaker and foundryman; consideration of basic or fundamental principles of casting design; establishment of good gating and risering procedure; standardization of melting and pouring, and good temperature control.

In the discussion David Basch, General Electric Co., Schenectady, N. Y., stated that he believed x-ray examination should be accompanied by breakdown tests which would indicate whether or not the part was fitted for the service requirements. That would prevent castings being blamed where faulty design was the reason for failure. Another speaker pointed out that fluorescent inspection was useful for locating surface cracks on permanent mold and die cast aluminum alloy castings.

Final paper on the program was presented by Mr. Basch, and related to magnesium castings. He said that in general the engineer considered magnesium castings from the viewpoint of low weight but that they had numerous other advantages such as outstanding machining characteristics; excellent fatigue strength; strength is not so dependent on section thickness as with other alloys, for example up to 1½-inch section the castings would show 80 to 85 per cent of test bar strength; also magnesium sand castings show freedom from stress corrosion.

Some disadvantages of magnesium alloy castings are low salt water corrosion resistance, and also to hot, humid atmospheres; low modulus of elasticity; low electrolytic corrosion resistance when in contact with other metals; large coefficient of expansion; subject to microporosity, weakness to concentrated stresses, and loss of strength at elevated temperatures. Mr. Basch stated that doubtful application of magnesium alloy castings would do more to hurt the industry than any other factor.

PATTERNMAKING PROBLEMS

Provide Lively Program

LIVELY discussion marked a session on patternmaking. Responsibilities of the patternmaker, his objectives, relationship between patternmaker and foundryman, apprenticeship training, craft technique, use of gypsum cements (with an entire paper devoted to this subject) and various other phases, kept interest at a high level. Numerous comments from the floor at times reached the crescendo of sharp debate, but there was general agreement on most points.

There was wide acceptance of the premise that the casting and not the pattern should be the end-objective of the patternmaker, although warning was made that in the case of the jobbing patternmaker, he should be responsible only for what he sells. Having fully met stipulated specifications, he should not be held financially liable for any failures that may later develop in the finished castings.

One large mid-western producer of castings, who not only has his own pattern shop but also buys patterns extensively on the outside, said that a cardinal policy with his company was to provide the foundry with patterns as the foundry wanted them. He then went on to stress the importance not only of co-operation between the pattern shop and the foundry, as well as the engineering department, but of using good pattern-making equipment. This question of good equipment, he said, constitutes a real challenge to the pattern making division of the association.

Co-chairman Frank C. Cech, Cleveland Trade School, Cleveland, then presiding, remarked that high quality pattern equipment including core boxes was essential if quality castings were expected. Unfortunately, too many times the equipment was mediocre due to lack of knowledge of the purchasing agent who primarily considers purchases on a price basis. First class pattern equipment costs money, and the purchasing agent should be educated as to what constitutes satisfactory equipment. Mr. Cech inquired if it were not time that the Pattern Making Division of the A.F.A give some consideration to that premise. General approval of those present was given to the idea of presenting a paper which would enlighten purchasing agents on what to look for in purchasing pattern equipment.

Need Good Equipment

L. F. Tucker, City Pattern Works, South Bend, Ind., in a paper on the need for closer co-operation between pattern shop and foundry, declared that "the better the pattern, the better the casting and the cheaper the casting."

Discussion from the floor brought out that competition among pattern shops often resulted in a reduction in the quality of patterns so that prices could be cut. Foundrymen were warned on this point, and the practice generally condemned.

The trend in the burden of sound apprenticeship training of patternmakers was away from the large integrated foundries to the jobber patternmakers, Mr. Tucker believed. While at least one large producer of castings disagreed sharply, general opinion, as voiced at the meeting, appeared in accord with the statement of Mr. Tucker, although it was admitted that various important casting producers, owning their own pattern shops, were doing an apprenticeship training job second to none.

One shortcoming in apprenticeship training as practiced by many pattern shops, Mr. Tucker believed, was lack of provision for foundry experience. In programs set up by groups in Chicago and South Bend, for instance, not one

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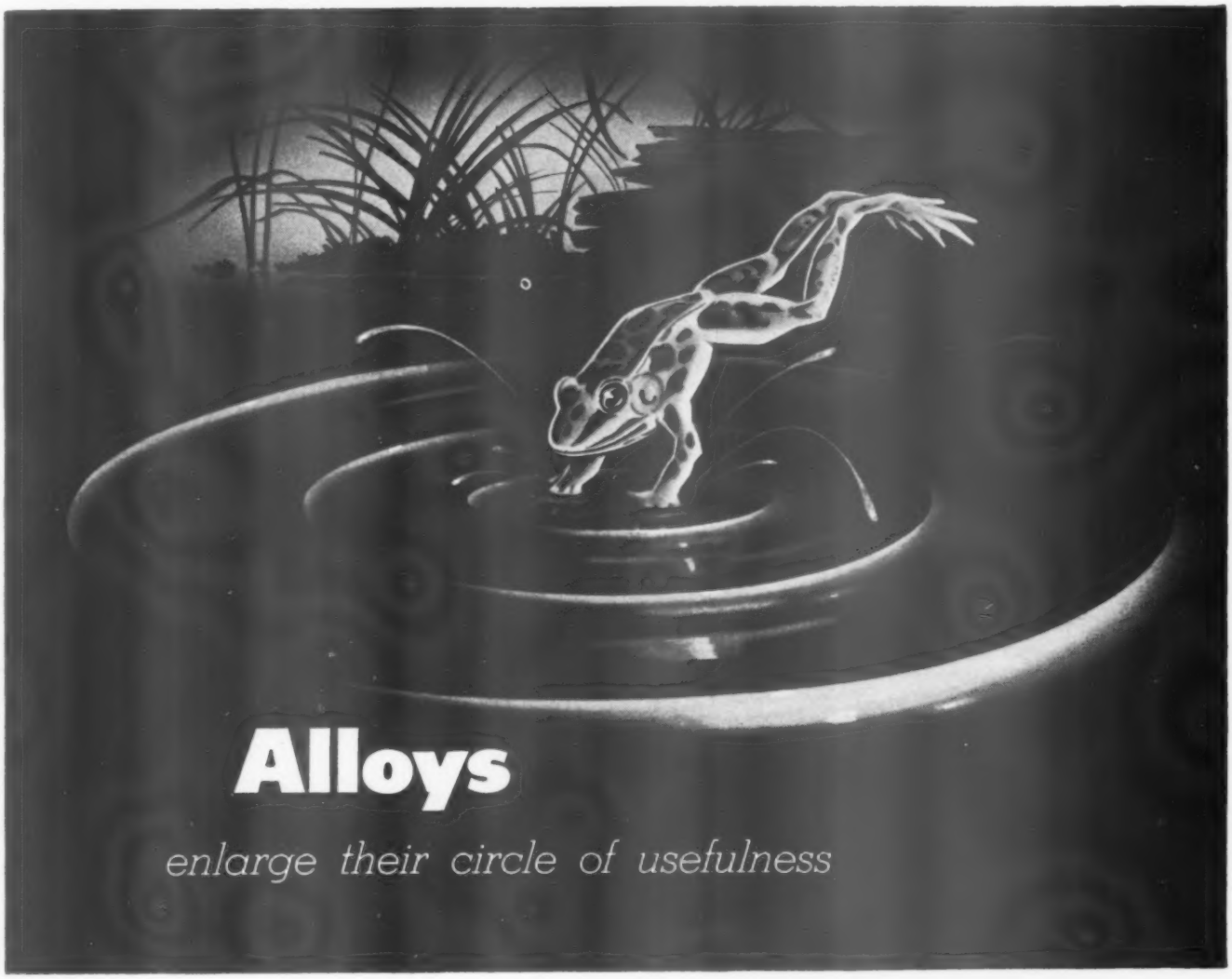

Increase of available supplies, as in the case of Tungsten, improved economy of use, as in the case of Molybdenum, and newly discovered metallurgical potencies, as in the case of Boron, point clearly to larger, more varied employment of alloy steels and irons in the months just ahead.

Alloying for one purpose or another will undoubtedly be hastened by the competition of non-ferrous metals and other materials.

One noteworthy development is the growing use of Molybdenum in structural steels, justified by the high degree of improvement obtained from very minute additions of the alloying element.

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hour, he said, is being devoted to the training of apprentices in the foundry. There are reasons why this often is difficult, but he emphasized, "just teaching to make patterns is not enough."

The speaker enumerated various matters on which he thought the patternmaker and foundry should come to an understanding before going ahead with pattern work. He illustrated many of his remarks with lantern slides.

In a paper presented by E. H. Schleede, United States Gypsum Co., Chicago, the application of gypsum cements to patternmaking was described. He discussed the mixing of these cements, the type of equipment used, which he said was relatively inexpensive. By aid of lantern slides he outlined several methods for working the plaster into a pattern. He indicated gypsum cements have found wide application in the making of airplane patterns. In this field patterns made from these cements required about one-third less time than when made from wood, he said.

One member in the audience predicted that shellac eventually no longer would be used in patternmaking, and described two types of coatings which he believed had many advantages over shellac coatings. These advantages include a much higher melting point, better abrasive resistance, quicker drying time and had better water resistance, among other considerations.

SHOP COURSE CONSIDERS

Chills, Coke and Welding

DISCUSSION of chill test methods and procedures at the first gray iron shop course session brought out some of the many factors which require correlation and standardization before any successful foundry control test will evolve from this group of methods. Ben D. Claffey, Gray Iron & Aluminum Division, General Malleable Corp., Waukesha, Wis. acted as chairman. Leading the discussion at this session, Tom E. Barlow, Battelle Memorial Institute, Columbus, O., pointed out the variation in test results when run against a wedge as against a chiller.

One need which was strongly emphasized in the forum was for a standard series of tests rather than a single test. It was pointed out that a chill test suitable for rolls or wheels would be unsuitable for other castings. Since it is not possible to obtain uniform conditions for chill tests from one foundry to another, standards should be established which permit some leeway.

Encounter Wide Variations

Variations in chill tests due to the use of green spoons or ladles can cause complete lack of correlation on what otherwise might be perfect iron. Spoons should be preheated to within the range of the iron temperature in order to avoid this difficulty.

Aging has a definite effect on chill tests, and it generally is believed this is due to the formation of an oxide coating which results in a change of the surface characteristics of the metal. Chill coatings of all kinds have definite effects on the test results, and uniformity is virtually impossible to achieve. In addition, variance in the metal structure from one chill to the next can cause varying results. Question of the vertical vs. horizontal chill test was brought up, but only inconclusive results have been obtainable thus far.

In discussing the effects of inoculations on chill control at the second gray iron shop course, Tom E. Barlow demonstrated by means of research data the relationship between strength and chill depth on inoculated and uninoculated cast irons. Kenneth H. Priestley, Eaton Mfg. Co., Vassar, Mich., was chairman.

According to Mr. Barlow, a definite relationship has been established showing that inoculation increases the strength of any iron in terms of its depth of chill. He showed in much the same manner the relationship between carbon equivalent and chill depth. In irons that have been inoculated a much lower carbon equivalent can be used on a given depth of chill.

There is considerable discussion on the best method of adding the inoculants. Although it is believed to be feasible, current practice does not favor addition of inoculants in the cupola charge. Loss between charge and pouring probably would be such that use of that method would be uneconomical. Furthermore, the quantity of inoculant used is so small and it must be controlled to such a tight degree that any loss must be calculated previously in order to prevent too great a residual amount of certain inoculants.

Methods of adding the inoculants in the ladle came in for considerable discussion, as well as the desirable quantity to be added. Generally speaking, it is best for safety sake to have a slightly excess addition, except in some irons with high carbon equivalents where an excessive volume of inoculant might be detrimental to the resulting physical properties. On irons with carbon equivalent above 4, effects of inoculants are negligible and therefore inoculation of these irons cannot be economically justified.

A discussion of by-product foundry coke and the influence of coke characteristics on cupola melting was presented by B. P. Mulcahy, Research Engineer, Citizens Gas & Coke Utility, Indianapolis at the third shop course. E. J. Burke, Hickman Williams & Co., Detroit, was chairman.

The dual role of coke as a fuel in the melting process, as well as a source of carbon for the metallurgical development of cast iron, has caused most of the misunderstanding concerning coke performance. Mr. Mulcahy's paper was an attempt to outline the function of coke in cupola melting and an outline of the process used in the manufacture of by-product coke.

A critical study of the cupola as a melting tool shows exactly where and how the coke is consumed and its effect on the chemical reactions which occur during the melting process. Critical study of the cupola brings out the fact that its height should be from 16 to 22 feet, with a straight vertical lining and with a well with the same diameter or slightly larger than the shaft. Its depth should not exceed 24 inches from the bottom to the lower plate of the tuyeres and a front slagging spout is desirable. Continuous tuyeres are recommended and the area in most instances should be restricted to a range of 16 to 28 per cent of the cupola cross section. Single rows of tuyeres are advocated. The speaker presented similar specifications for the air blast, the size and character of melting stock and the characteristics of the coke to be used.

Welding Gray Iron

Interesting question and answer session on the use of welding in the gray iron foundry was led by Fred J. Walls, International Nickel Co., Detroit, in the fourth session on gray iron shop course. H. H. Wilder, Vanadium Corp. of America, Detroit, was chairman. Welding of cast iron was considered both from the standpoint of metallurgy and mechanical difficulties of the job. Complete control of the heating cycle is necessary to avoid white iron or a martensitic structure.

In all cases, cast iron should be preheated in some manner, either by a torch in a furnace or any equally effective heating unit. However, this preheating should never go above the critical point of the iron, which is in the neighborhood of 1200 degrees.

It is good practice to place the welding job under the control of a metallurgist so that the welding operators can be advised constantly as to the proper operating temperatures for successful welding. Iron structures soften so rapidly above the critical point that a careless welding operator can ruin a casting even though the weld apparently is properly made. The reason for this is that a physical change occurs in the crystalline structure of the casting above the critical point and as it cools down the iron recrystallizes in a different form and without a complete heat treatment it is impossible to restore the iron to its previous properties.

In the preheating operation time is a factor and even low temperatures of approximately 900 degrees Fahr. can pro-

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duce a change in physical structure of the iron if it is soaked over extended periods. The time of the preheating must be synchronized with the temperature in order to provide the most efficient operation. Thorough soaking of the cast iron to be welded is not always necessary. The proper criterion is that the surface to be welded should be at the proper welding temperature.

Preheating also creates problems in expansion, particularly if the casting must hold its dimensions closely after the welding operation. In general a welding rod with higher graphitizing qualities than in the casting should be used, because the welding operation burns out carbon which must be replaced. Generally speaking, the rod should be as near the analysis of the casting as is possible. If a gas torch is used, a neutral flame is most desirable over one slightly carburizing in nature.

CENTRIFUGAL CASTING

Sessions Draw Crowds

INTEREST in the subject of centrifugal casting methods, materials and equipment was evidenced by the large audience that filled every seat in the meeting room, with a generous fringe of standees against the side and end walls. This first session on the subject was presided over by A. K. Higgins Allis-Chalmers Mfg. Co., Milwaukee, with Nathan Janco, Centrifugal Casting Machine Co., Tulsa, Okla., as co-chairman.

W. W. Edens, Ampco Metal Inc., Milwaukee, illustrated many features in his paper "Beneficial Effect of Centrifugal Casting Upon Heavy Nonferrous Alloy Castings," with a series of slides showing the structure of various sample pieces of metal sand cast, permanent mold cast and centrifugal cast. Accompanying charts showed a comparison of physical properties. He confined his discussion and presentation to cylindrical castings, and explained that a certain difference existed between the production of this type casting and more or less odd shaped castings. With the chemical analysis similar in all cases, the centrifugal castings show a better grain structure and improved physical properties. The method is not a cureall for every type of defect, but is highly efficacious under suitable conditions.

Pour at Higher Temperature

Replying to questions from the floor the speaker stated that the change in structure between sand and centrifugal castings is not as great in aluminum bronze and manganese bronze as in the tin bronzes. Centrifugal castings are poured at approximately 100 degrees higher than similar metal poured in ordinary sand molds. Molds are preheated either with a torch or by pouring several castings. All iron molds are not coated. Very difficult problems arise in casting phosphor bronze in iron molds. The best metal is a 0.45 per cent carbon steel.

Jack Weber, Ampco Metal Inc., Milwaukee, presented an interesting paper on calculations and devices involved in the operation of small centrifugal casting machines. The company builds its own machines and over a period of years has developed a safety program that has reduced even minor accidents to a minimum. Through constant insistence the employes develop a species of sixth sense which enables them to avoid or prevent accidents.

I. E. Cox, National Bearing Metals Co., St. Louis, in presenting his paper "Centrifugal Casting of Nonferrous Metals," described in detail development of the process at his company's plant. It was realized in the beginning that the problem pertained more to engineering than to foundry practice. An extensive laboratory fitted for chemical and physical testing was installed and an exhaustive testing program was instituted to lay a proper foundation. A full year elapsed before the first machine operated satisfactorily on a special job. Now one man does the work formerly requiring four, and the output on the part has been increased 400 per cent.

Many mold materials were tried, including sand, graphite and gray iron. Final choice settled upon an open grain molybdenum iron coated with colloidal lead or graphite, or bentonite and silica flour. Melting practice is closely controlled. Speed of mold rotation varies from 100 to 1300 revolutions per minute. Replying to a question the speaker stated that the height of a vertical mold should not exceed the diameter. Molds operate most satisfactorily at a temperature from 350 to 450 degrees Fahr.

A paper on precision castings by the investment molding process was presented by Robert Neiman, Whip-Mix Corp., Louisville, Ky.

Interest in centrifugal casting methods was further illustrated by an attendance of around 300 at the final session on that subject held Friday afternoon. Dr. A. E. Schuh, U. S. Pipe & Foundry Co., Burlington, N. J., was chairman, and J. B. Caine, Sawbrook Steel Casting Co., Lockland, O., was co-chairman. Opening paper at the session prepared by Peter Blackwood and John Perkins, Ford Motor Co. of Canada, Windsor, Ont., was presented by the latter, and gave a detailed description of the methods of centrifugal casting employed at that plant. Dry sand, metal molds, and green sand molds are used; the latter being a special development. Various types of castings are made by the process including the production of pieces which are located around the periphery of the mold, and fed from a central sprue through radial gates.

In sand molds many castings are made at one time by stacking, and in one instance 192 castings are made at one pouring. Yields obtained run from 65 to 91 per cent depending upon the type of casting, and arrangement in mold. Green sand molds are made from sharp sand bonded with 12.5 per cent halloysite (a type of kaolinite). Mold is subjected to high pressure during the squeeze, and after pattern removal and air setting the mold is sprayed with a mixture of alcohol, core oil, glutrin and halloysite. No torch drying is required to obtain a dry skin.

Charles K. Donoho, American Cast Iron Pipe Co., Birmingham, presented a paper describing some of the theoretical and practical phases of centrifugal casting, and some of the procedures employed in his firm's foundry in making steel castings by the process. Both horizontal and vertical axis machines are used as well as metal and sand molds. According to Mr. Donoho there is little tendency toward pinhole porosity in true centrifugal castings, hence acid electric steel is used without any special deoxidation. Investigation of specimens cut from walls of some castings with and without aluminum deoxidation showed that the latter had much higher elongation. Examination of micrographs indicated that steel deoxidized with aluminum showed the deleterious type II sulphide inclusions located in the grain boundaries.

Spinning Speeds Discussed

Concluding paper presented by F. G. Carrington, Lynchburg Foundry Co., Lynchburg, Va., dealt with a discussion on spinning speeds of centrifugal casting machines. He gave numerous formulas for determining minimum spinning speed for cavity surface, influence of sloped angle on cavity shape and spinning speed, cavity dimensions and volume for vertical and sloping molds, pressure on mold end, radial pressure on mold surface, bursting stress in mold wall, and pressure gradient across metal section. Other phases considered by Mr. Carrington included heat transfer, acceleration and flow in vertical and inclined molds, methods of pouring, molds, machine construction, segregation, and casting defects due to high spinning speeds.

Space limitations prevent publication in this issue of reports on all technical sessions of the Buffalo foundry congress. Concluding reports will appear next month.

THE EDITORS

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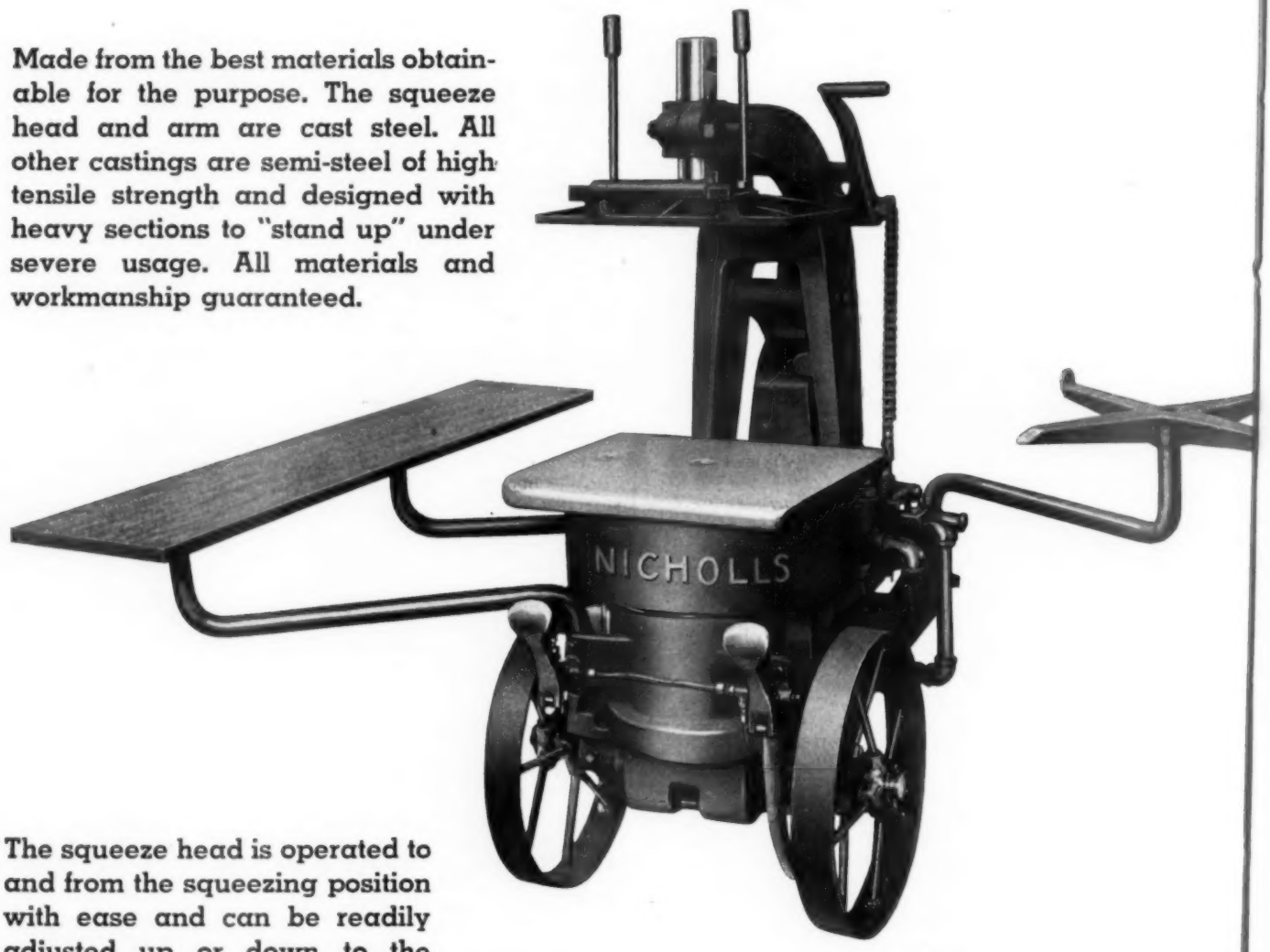


TYPE 10M
JOLT SQUEEZER

The squeeze head is operated to and from the squeezing position with ease and can be readily adjusted up or down to the proper height of the flask. The squeeze valve cannot be operated unless the squeeze head is locked in position for squeezing. Equipped with adjustable mold shelf and riddle rack that can be adjusted up or down and in or out.

Stationary and Portable for JOBBING AND PRODUCTION WORK

A compact sturdy machine.

Simple rugged construction insures successful production. This Type 16M Heavy Duty Jolt Squeezer was designed especially for steel foundry service, with a hard solid jolt, required when making molds for steel castings. This machine is provided with an interlocking means which insures the head being in the squeezing position before the squeeze valve can be operated. The squeeze head is operated to and from the squeezing position with ease.

The base and squeeze cylinder is a heavy one piece semi-steel casting. All pins and bushings are case hardened and ground to size. The squeeze valve can be removed without disturbing any piping. This machine requires a minimum of floor space. For specifications see back page.

TYPE 16-M JOLT SQUEEZER

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL, LONG ISLAND, NEW YORK
Established 1910

Foreign Manufacturers and Selling Agents—
For Continental Europe and Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland

NICHOLLS

activities of foundry GROUPS

Toledo

TOLEDO Chapter of the A.F.A. featured "home talent" at its April 18 meeting. Speaker was W. C. (Bill) Adler, Ohio Steel Foundry Co., Lima, O., one of the chapter's directors, who presented an address on gating and risering of steel castings. His talk was most comprehensive and emphasized atmospheric pressure feeding and directional solidification. Mr. Adler's discussion was profusely illustrated by lantern slides as well as by actual cores and castings.

Newly elected officers and directors for the coming year were announced at the meeting and include: Chairman, Leighton M. Long, Leighton M. Long & Associates, Toledo; vice chairman, W. P. Mack, Bruce Foundry, Tecumseh, Mich.; secretary-treasurer, Brock Pickett, Unitcast Corp., Toledo. Directors are W. C. Adler; W. A. O'Brien, Electric Auto-Lite Co., Fostoria, O.; F. F. Ensign, Ensign Foundry Co., Toledo; N. P. Mahoney, Maumee Malleable Castings Co., Toledo; G. R. Rusk, Freeman Supply Co., Toledo; C. F. Carson, National Supply Co., Toledo; R. T. Jansen, Unitcast Corp., Toledo; R. B. Bunting, Bunting Brass & Bronze Co., Toledo, and Victor E. Zang, Unicast Corp., Toledo.—*R. B. Bunting, secretary-treasurer.*

Reading

REGULAR monthly meeting of the Reading Foundrymen's Association, held in the Berkshire Hotel, Reading, Pa., April 18, had an attendance of more than 100 members and guests. Hermann P. Good, president of the association, presided.

George S. Evans, metallurgist, Mathieson Alkali Works Inc., New York, the speaker of the evening, viewed the future of the gray iron casting industry with qualified confidence. He predicted that "if history repeats itself, one out of ten or more of the foundries represented here tonight will have gone out of business before 10 years have passed."

The foundries that will pass out of existence during this period of highly competitive conditions that will most surely follow the postwar boom will have made their own destiny, he said. They will have prospered or declined, not alone on the basis of their hours of labor, but more in proportion to their recognition of changing economic conditions and their efforts in keeping astride developments and improvements in manufacturing processes making for superior quality, greater usability and lower cost castings, he added.

Mr. Evans stated that gray iron foundries annually turn out about six times the tonnage of their steel foundry cousins, yet this is called a steel war without realizing that except for first having iron castings, we would not have steel, aluminum, magnesium, or high explosives.

"Humans and mass psychology being the same today as yesterday, we can expect the same reactions after this war as those which followed all previous wars from the beginning of time," Mr. Evans said. First a temporary relaxation of effort and a lull in industry, immediately following cessation of hostilities, will occur while industry is getting its feet on the ground and changing over to peace economy.

Following this temporary lull, Mr. Evans predicted that there will be a quickening of action and a boom in every kind of peacetime business in proportion to the magnitude and length of the war just ended, and finally, after a few years a proportionately drastic depression. "Anyone who ignores this psychoeconomic law and who fails to get his house in order to meet and withstand these changes, is destined to ultimate failure."

"I think that it can be said with confidence, that following the peace, the capital goods industry will be busy for many years building new and better machines, not alone for home use, but for Russia and especially China," Mr. Evans predicted.

"High war wages will continue at least in part after the peace, and the higher standard of living which has resulted, backed up by the reservoir of war bonds in the hands of the people, will create a tremendous demand for more and better homes, and this demand will form a backlog of business for foundries catering to the building trades for several years.

"Foundrymen and the metal trades in general cannot afford to be too complacent, for in this field we will see some most interesting developments in the applications of plastic for undreamed uses."—*H. C. Cummings, secretary.*

Pittsburgh

USE of boron in nonferrous, gray iron, malleable and steel castings was discussed at the April meeting of Pittsburgh Foundrymen's association. N. F. Tisdale, Molybdenum Corp. of America, outlined the development and use of boron and boron compounds in the foundry. Methods of addition and quantities to be used, as well as methods of analysis and amount of boron recovery to be expected, were covered.

One of the most critical factors in the use of boron is the addition of exactly the proper quantity, which varies from as little as 0.001 per cent in the case of malleable iron to as much as 0.05 in some of the nonferrous applications. The most satisfactory volume for use in connection with steel has been found to be 0.003 per cent. Interesting work has also been done with the special alloys, including stainless steel, high manganese steels and special metal for turbine applications.

In addition to Mr. Tisdale's paper on boron, two movies supplied by the War Department were shown, and the nominating committee, consisting of H. M. Wilson, Taylor Wilson Mfg. Co.; Hugo Hautman, Westinghouse Air Brake Co.; and W. H. Satterfield, Pittsburgh Steel Foundry Corp., submitted the report on officers for 1944-45. Harry Kennedy, Continental Foundry & Machine Co., was nominated for president; N. J. Kelly, Kelly Foundry Co., vice president; and Ferdinand G. Schultz, Ferdinand G. Schultz Co., secretary-treasurer. Named to the executive committee were: H. P. Spilker, Sterrit Thomas Foundry Co.; T. A. Reynolds; E. C. Buerkle, National Bearing Metals Corp.; C. B. Dick, Westinghouse Electric & Mfg. Co.; and M. J. Kellner, Walworth Co.

The meeting also expressed regret at the sudden and serious illness of Mr. Spilker, who is chairman of the executive committee of the association.—*R. L. Hartford.*

Detroit

AT THE April 20 meeting of the Detroit Chapter of the A.F.A., V. A. Crosby, chairman of the nominating committee, announced the following slate of new officers and directors for 1944-45: Chairman, R. G. McElwee, Vanadium Corp. of America; vice chairman, E. C. Hoenicke, Eaton Mfg. Co.; treasurer, W. W. Bowring, Frederic B. Stevens Inc.; secretary, A. H. Allen, THE FOUNDRY.

Directors, 3-year term: John E. Linabury, manufacturing staff, General Motors Corp.; Gordon C. Creusere, Semet-Solvay Co.; Manly E. Brooks, Dowmetal Foundry, Dow Chemical Co.; Omer L. Allen, Pontiac Motor Division, GMC.

Directors, 2-year term: F. A. Melmoth, Detroit Steel Casting Co.; E. R. Darby, Federal Mogul Corp.; A. W. Stolzenburg, Aluminum Co. of America; O. F. Carpenter, Packard Motor Car Co.

Directors, 1-year term: C. E. Silver, Michigan Steel Casting Co.; F. A. Jensen, National Engineering Co.; V. A. Crosby, Climax Molybdenum Co.; Harvey J. Miller, Walker Metal Products Co.

Three roundtable sessions were scheduled following the routine announce-

(*Continued on page* 194)

BREAKING THE RECORD!

One man does the running—but backing him up are coach, trainer and teammates. Back of profitable casting production is another team—good men using good methods working with good materials.

MOGUL CEREAL BINDER . . . *saves binder costs;* reduces baking time and cleaning costs; increases oven capacity and core production . . . PRODUCES QUALITY CASTINGS.

MOGUL is a perfect Green Bond, which increases permeability in cores and bonds. MOGUL can be used in cores when both green and dry strengths are required.

MOGUL works with core oil, because it decreases drying time, and produces smooth cores. MOGUL works perfectly with pitch or resin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sand.

Team up with MOGUL and KORDEK — you can depend on them.

KORDEK

Kordek is a perfect DRY BOND. Kordek can be used in smaller proportions than most dry binders. Produces better castings with fewer discards.

CORN PRODUCTS SALES CO.

17 BATTERY PLACE
NEW YORK 4, N. Y.

(*Continued from page* 192)

ments. The malleable group drew about 20; the aluminum group 60, and the gray iron-steel group 70. The latter heard Harry W. Dietert explain some of his recent research on mold atmosphere control in reducing penetration in steel casting. This is a new foundry development and it was the first time it had been presented formally to foundrymen. By means of a movie and slides, Mr. Dietert reviewed his tests with various molding sand mixtures, to which different types of chemical had been added in amounts of 5 per cent to reduce oxidizing conditions during the interval molten metal is in contact with the sand.

A. T. Ruppe, superintendent of the Bendix Foundry Division of Bendix Aviation Corp. reviewed aluminum foundry practices at his plant, paying particular attention to cleaning and conditioning castings after removal from the sand. He presented a series of slides depicting techniques employed at the Bendix aluminum foundry.

Gas atmospheres for furnaces used in malleable iron annealing practice were discussed by J. A. Down, engineer with Holcroft & Co., at the malleable roundtable. His comment provoked a number of pertinent questions from malleable producers present.—*A. H. Allen, secretary.*

St. Louis

REGULAR monthly meeting of the St. Louis District Chapter of the A.F.A. was held at the De Soto Hotel, St. Louis, April 13 with 75 members attending.

Chairman L. A. Kleber appointed the following members to serve on the nominating committee to select new officers and directors to be voted on at the May meeting. Chairman, J. D. Walsh, Scullin Steel Co.; C. B. Shanley, Semi-Steel Casting Co.; Fred Riggan, Key Co.; Clee Shy, Banner Iron Works; R. T. Leisk, American Steel Foundries; and G. W. Mitsch, American Car & Foundry Co.

Chairman Kleber introduced the speaker of the evening, N. J. Dunbeck, vice president, Eastern Clay Products Inc., Eifort, O., whose subject was "How to Select a Bond Clay." Mr. Dunbeck gave a very informative talk covering the blending and use of the various bonding clays to secure desired results. His talk was followed by an unusually long discussion period which brought out much additional useful information.—*J. H. Williamson, secretary-treasurer.*

Rochester

MAY meeting of the Rochester Chapter of the A.F.A. was held at the University of Rochester, May 3, with Harry W. Dietert, Harry W. Dietert Co., Detroit, as speaker on the subject "The Behavior of Molding Sands and Cores at Elevated Temperatures". A number of colored motion pictures were shown to illustrate his extensive study of sand phenomena at casting pouring temperatures, through dilatometer tests.

In contrast to room temperature tests, the dilatometer allows a measurement of the changes taking place in molding and core sands at casting pouring temperatures. The rate of collapsibility, the formation of fissures and scabs, and the measurement of retained strength were clearly pictured, together with the effects of modifications in sand practice to correct various mold and core defects.

The chapter also was privileged to see the results of some very recent preliminary work on the subject of controlled atmospheres in molds—a subject which will undoubtedly receive considerable study in the near future.

Next meeting of the chapter, scheduled for June 7, will be devoted to the subject of foundry refractories. Cecil E. Bales, vice president, Ironton Fire Brick Co., Ironton, O., and president of the American Ceramic Society, will be guest speaker at that meeting.—*Donald E. Webster, secretary-treasurer.*

AT ST. LOUIS: M. J. Gregory, Caterpillar Tractor Co., and Louis J. Desparois, Pickands Mather & Co., inspect display of blown cores at recent meeting of the St. Louis chapter of the A.F.A.

Chicago

CHICAGO Chapter of the A.F.A., wound up a most successful year at its regular monthly meeting, May 1, at the Chicago Bar Association, a season which was so successful from the standpoint of attendance that contemplated future growth may place some strain on meeting-place accommodations next year.

The Bar Association has given notice that because of wartime food shortages dinners served must be limited to 250 in the 1944-45 season. Despite this unexpected restriction, chapter members indicated unanimously a desire to return to the same quarters. From present outlook, two of next year's meetings hold prospect of attracting turnouts approaching the 400-mark.

The May meeting provided a double-feature program — the fourth in the series of round-table discussions, and a recitation of first-hand experiences in bombing of Germany by two British flying officers. These flyers, Warrant Officers C. Smith and Harold S. Pearce of the R.A.F., for some months have been stationed at the Museum of Science and Industry, Chicago, with the British government's war exhibit.

Following dinner, President M. F. Becker, vice president, Whiting Corp., Harvey, Ill., announced no additional names had been received to the 1944-45 officer nominations reported at the April meeting and declared their election. The new officers were formally introduced as follows: President, Arthur S. Klopf, vice president and manager, Foundry Division, Hansell-Elcock Co.; vice president, J. C. Gore, Chicago manager, Werner G. Smith Co.; and secretary-treasurer, Frank E. Wartgow, manager, employes' suggestion system, American Steel Foundries.

Directors include Retiring President Becker; Laurence H. Hahn, metallurgist, Sivyer Steel Casting Co.; W. D. McMillan, works metallurgist, McCormick Works, International Harvester Co.; and Harry M. St. John, superintendent, brass foundry, Crane Co.

President-Elect Klopf presented the past president's statuette to Mr. Becker as a token of appreciation of his service to the chapter during the past year.

Gray Iron division roundtable featured Tom E. Barlow, research staff, Battelle Memorial Institute, Columbus, O., speaking on "Close Cupola Control and How To Get It." H. Kenneth Briggs, metallurgist, Miller & Co., was chairman.

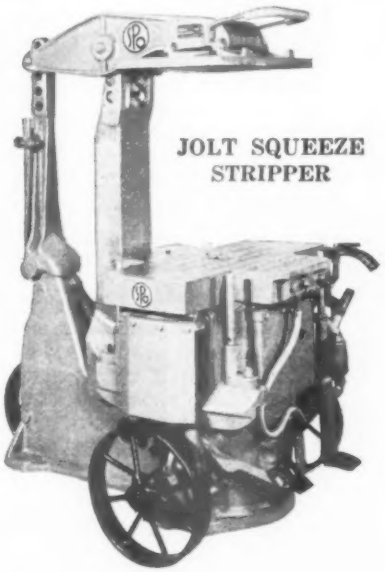
C. A. Brantingham, president, Ebaloy Foundries Inc., Rockford, Ill., spoke on "Aluminum and Magnesium" before the Nonferrous division. Dr. R. F. Thom-

(*Continued on page* 196)

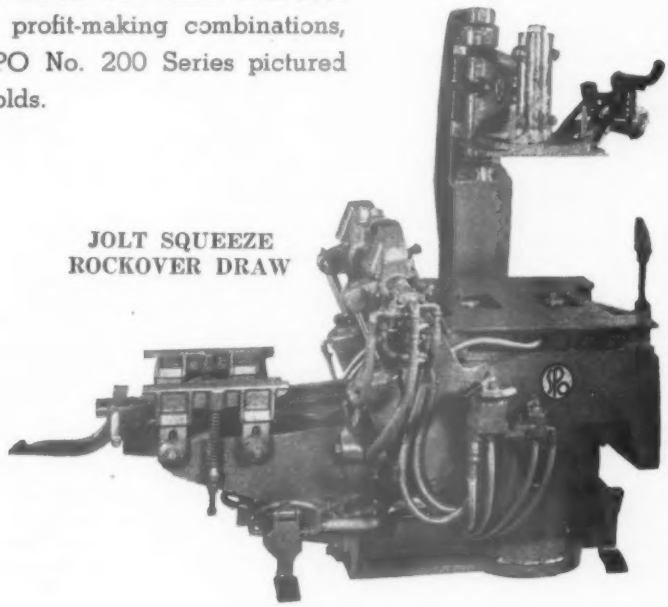
SPO MOLDING MACHINES
Team Up to Increase Production

Typical Combinations for Fast Production of Jobbing Work

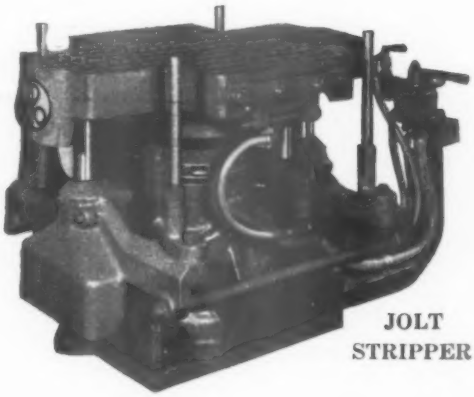
Here's how to pair up SPO Molding Machines and greatly hike production. You can use either stripper shown below with either rock-over machine. That gives you four practical, profit-making combinations, doesn't it? Also, within its scope, the SPO No. 200 Series pictured above left turns out both cope and drag molds.



JOLT SQUEEZE STRIPPER



JOLT SQUEEZE ROCKOVER DRAW



JOLT STRIPPER

JOLT ROCKOVER DRAW

Bulletins are ready on any of these machines. Which are you most interested in?

SPO INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND 5, OHIO

(*Continued from page* 194)

son, metallurgist, Dodge Chicago Plant, Chrysler Corp., was chairman.

Steel division devoted its attention to "Foundry Maintenance," with three discussion leaders as follows: James Thomson, chief plant engineer, Continental Foundry & Machine Co., East Chicago, Ind.; A. M. McIntyre, electrical engineer, same company; and W. C. Cress, research ceramist, Armour Research Foundation. A. W. Gregg, executive engineer, Whiting Corp., Harvey, Ill., was chairman.

Martin Rintz, superintendent, Continental Foundry & Machine Co., East Chicago, Ind., addressed the Pattern division on "Pattern Construction Methods." H. K. Swanson, owner, Swanson Pattern & Model Works, East Chicago, Ind., presided.—*Erle F. Ross.*

Quad-City

QUAD CITY Chapter's monthly meeting held April 17 at the Fort Armstrong Hotel, Rock Island, Ill., had 110 members and guests present. Following an excellent chicken dinner, State Senator Charles F. Carpenter gave a brief coffee-talk on "Legislative Procedure in Illinois." This was well received and of a highly informative nature.

Featured speaker of the evening was Donald J. Reese, formerly of International Nickel Co., and now with WPB, Washington, whose subject was "Cupola Practice." This was covered in an interesting and competent manner.

Mr. Reese said that no one need apologize for using a cupola, since it is the best known type of melting unit for gray iron. The cupola is the only truly continuous melting unit, and it has the largest ability to do work when considering unit area and time involved. Additional reasons for using cupolas are low conversion costs, low capital investments, high-speed melting, and the ability of cupolas to melt scrap materials successfully.

Mr. Reese drew a very clear picture of the essentials of good cupola operation. Accurate weighing, consideration of fuels, and reasonable supplies of raw materials were stressed. The uniform distribution of fuel over the cupola area at the proper bed height was explained. Mr. Reese compared the cupola air supply with that of the gasoline engine carburetor. He said that 75 per cent of cupola inefficiency is caused by the improper air supply.

Hy Bornstein, Deere & Co., acted as technical chairman, and many worthwhile points were brought out during the discussion period.—*H. L. Creps, secretary-treasurer.*

Cincinnati

REGULAR monthly meeting of the Cincinnati Chapter of the A.F.A., held May 8 at the Engineering Society Headquarters, Cincinnati, had an attendance of about 75 members and guests. Edward H. King, chapter chairman, presided.

The evening's program was divided into two parts. The first was the showing of three sound films produced by General Motors Corp. and entitled: "Diesel, the Modern Power," "Sand and Flame," and "How Not To Conduct a Meeting." The second part of the program was the showing of the sound film, "Symphony in Brass and Bronze," produced by H. Kramer & Co., Chicago. William Romanoff, vice president and technical superintendent of the company, was on hand to answer numerous questions.

Annual stag picnic of the chapter will be held June 8 at the Summit Hills Country Club.—*Martin F. Milligan, secretary*

Birmingham

JAMES A. DOWNEY Jr., area director, War Manpower Commission, was the speaker at the April meeting of Birmingham District Chapter of the A.F.A., discussing the live topic of manpower. His subject was "The Manpower Barrel in Relation to the Foundryman's Ladle."

Discussing ways and means of relieving labor shortage, he pointed out that the use of women in foundry work is feasible, and cited several plants in the Birmingham district which are making use of women in their foundry work. He suggested that this means be used by foundrymen during this critical period of manpower shortage.

The following were reported by the nominating committee for election at the last meeting, May 21: Chairman, Joe T. Gilbert, superintendent of production, Stockham Pipe Fittings Co.; vice chairman, John F. Wakeland, general foreman, McWane Cast Iron Pipe Co.; secretary-treasurer, Fred K. Brown, sales manager, Adams, Rowe & Norman Inc. Howard Nelson, vice president, Hill & Griffith Co., and Alex Murdock, superintendent Southern Wheel Division, American Brake Shoe Co., were slated for directors.—*H. B. McLaurine.*

Western Michigan

APRIL 10 meeting of the Western Michigan Chapter of the A.F.A. at Hotel Ferry, Grand Haven, Mich., attracted 100 members and guests to hear J. B. Caine, metallurgist, Sawbrook Castings Co., Lockland, O., whose subject was "Adhering, Alias 'Burnt On' Sand."

Mr. Caine spoke on the subject matter in his paper published in *Transactions* and elaborated wherever necessary. His main theme was the explanation of "adhering" as against "burnt-on sand", and why we should not speak of "burnt-on sand" without analyzing why the sand sticks to the casting. After the lecture a lively and instructive discussion on sand in general ensued.

Western Michigan Chapter held its last meeting of the year May 8.

Following a splendid fried chicken dinner, Fred A. Pampel, foundry engineer of Chain Belt Co., Milwaukee, gave a short talk on "Mechanical Equipment and Its Trend in Modern Foundries," after which he led a very interesting and informative discussion on foundry equipment, especially sand handling and mulling.

Before the regular meeting the annual election of officers was held, with the following results: Chairman, Joseph L. Brooks, metallurgist, Muskegon Piston Ring Co., Sparta, Mich.; vice chairman, A. E. Jacobson, Grand Haven Brass Foundry, Grand Haven, Mich.; secretary, J. Wesley Lee, vice president, Challenge Machinery Co., Grand Haven, Mich.; treasurer, Vern L. Tietsort, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.—*C. H. Cousineau, secretary.*

QUAD CITY CHAPTER MEETING: View of speakers' table at recent meeting in Rock Island, Ill., shows, left to right: Hy Bornstein, Deere & Co., Moline, Ill.; Donald J. Reese, International Nickel Co. and WPB; W. E. Jones, Ordnance Steel Foundry Co., Bettendorf, Iowa, and chapter chairman; Charles F. Carpenter, Illinois state senator

Northern California

APRIL 14 meeting of the Northern California Chapter of the A.F.A. was held at Angelo's restaurant just outside the Oklahoma city limits with an attendance of 77. Harry Bossi, chapter president, presided, and Alex Homberger, vice chairman, acted as technical chairman in the absence of Dave Reeder, program chairman.

Principal speaker of the evening was

(*Continued on page* 218)

If it's a question of improved gray iron castings . . .

"FERROCARBO" IS THE ANSWER

"FERROCARBO" is a powerful deoxidizer or degasifier—developed through Carborundum Research—

Added to cupola, it greatly increases the fluidity of the iron resulting in finer grain, higher strength castings.

Castings of "Ferrocarbo" treated iron can be machined at high speeds—they take an excellent finish—are stronger, tougher and more uniform in structure—free from hard spots—

They will show greater resistance to wear and impact—you will have far fewer rejects.

And "Ferrocarbo" makes it possible to produce such improved iron economically. The Carborundum Company, Refractory Division, Perth Amboy, N. J.

REFRACTORY CARBORUNDUM PRODUCTS

"Ferrocarbo" by CARBORUNDUM TRADE MARK

District Sales Branches: Boston, Chicago, Cleveland, Detroit, Philadelphia, Pittsburgh. Agents: McConnell Sales and Engineering Corp., Birmingham, Ala.; Christy Fire Brick Company, St. Louis; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Co., Los Angeles, San Francisco, Seattle; Denver Fireclay Company, El Paso, Texas.

Distributed by Kerchner, Marshall & Co., Pittsburgh and Cleveland; Miller & Company, Chicago, St. Louis and Cincinnati

(Carborundum and Ferrocarbo are registered trade marks of and indicate manufacture by The Carborundum Company)

foundry DEVELOPMENTS

STUDY of design of mouths of feeders for malleable castings disclosed some interesting facts when consideration was given to the factors affecting heat transfer. They are: The ratio of mass to surface area must be as high as possible which suggests a round mouth rather than a flat one. Sand surrounding the mouth should be heated as much as possible during pouring of the casting because a low rate of heat loss through the sand is desirable. That suggests sharp re-entrant angles between the feeder and the casting. Put into practice the idea gave surprisingly good feeding results through use of thin vertical mouths extending along the side of the blind riser, and leading into the casting cavity.

♦ ♦ ♦

ALUMINUM sand-casting alloy which is reported to have high physical properties after natural aging or artificial aging without previous solution or quench heat treatment is composed of 5.25 per cent zinc, 0.50 per cent magnesium, 0.50 per cent chromium, 1 per cent maximum iron, 0.2 per cent titanium, 0.4 per cent maximum copper, 0.3 per cent maximum silicon, and remainder aluminum. Minimum physical properties are indicated as 20,000 pounds per square inch yield point; 32,000 pounds per square inch tensile strength, and 3.0 per cent elongation in 2 inches. The alloy is said to have good corrosion resisting properties, can be cast into thin sections, and poured over a wide range in temperature.

♦ ♦ ♦

GOOD viewing conditions for radiographs can make the difference between seeing the defects recorded, and missing them, according to Morrison and Nodwell. A bright light source should be available for examination of radiographs of thin sections obtained by radium since high density is essential in that work. The film should be shielded so that there is no adjacent area brighter than the film itself. Any adjacent bright area will hinder the eye in accommodating itself to the brightness of the film. The room should be somewhat darkened as fine-grain films have rather glossy surfaces, and any extraneous light in the room will reflect from the film decreasing the visibility of the shadows.

♦ ♦ ♦

CANADIAN foundry using green sand molds for certain types of castings poured by the centrifugal process employs halloysite (a type of kaolinite) as the bonding agent, and high pressure squeeze on the molding machine. Approximately 12.5 per cent bond is used in the sand. After removal of the pattern the mold is allowed to air dry or set for a short period, and then sprayed with a solution composed of equal parts of alcohol, core oil and glutrin to which sufficient halloysite is added to bring the specific gravity of the mixture to 55 degrees Baume. Molds are sprayed cold as no torching is required to make the skin dry. No supporting flasks are needed when the mold is spun.

♦ ♦ ♦

PROCEDURE proposed by a British author in our overseas contemporary, *Foundry Trade Journal*, to provide rapid and uniform bonding of synthetic molding sands is use of ceramic slip or deflocculated clay during mixing. Slip is prepared by mixing clay with water, ammonium oxalate, and sodium silicate; the latter being the deflocculating agents. In one experiment a sand made with 6.66 per cent clay, 3.36 per cent water, 0.078 per cent ammonium oxalate and 0.015 per cent sodium silicate (calculated as dry Na_2O_3-SiO_2) showed a green strength of 2.33 pounds per square inch (10 blows A.F.A. machine), and 55 pounds per square inch dry strength. Addition of 0.2 per cent lime to the sand increased the green strength to 9.0 pounds per square inch, and decreased the dry strength to 11 pounds per square inch.

♦ ♦ ♦

ACCORDING to the official exchange paper of the Institute of British Foundrymen which was presented at the recent foundry congress of the A.F.A., the experience of Rolls-Royce Ltd. with aluminum alloy castings is that where a part can be produced by permanent molding it possesses several advantages over sand castings. Those include: Smoother finish and closer dimensional accuracy; greater possible speed of production; conservation of raw material; reduction of production scrap, and improved mechanical properties in the casting. While the cost of the permanent mold frequently is more than that for pattern equipment, the reduced cost per casting in quantity production soon equalizes the difference in cost of the two types of tooling.

♦ ♦ ♦

COLOR screams. It soothes. It irritates. It stimulates. It says, "Stop—Look—Take Care." It speaks a universal language to the mind through the eyes. So states Robert A. Massey in an article in the April-May issue of *DuPont Magazine* on "A Safety Color Code for Industry". It describes a system for safety identification built around colors that commonly are recognized, and have high visibility and attention value. The colors and applications are: High-visibility Yellow—to indicate strike—against, stumbling or tripping hazards. Alert Orange—to mark parts of machines that might cut or crush a worker. Safety Green—to identify first aid equipment, dispensaries, and location of safety devices. Fire-protection Red—to point out fire protection equipment. Precaution Blue—to warn workers against use of equipment under repair, or machinery that should not be started. Traffic White—to mark aisles, storage places and waste receivers. Copies of the safety color code may be obtained from E. I. duPont deNemours & Co. Inc., Finishes Division, Wilmington 98, Del.

♦ ♦ ♦

High spinning speed in centrifugal practice sometimes causes cracks in the metal surface contacting the mold. In cast iron such cracks occur with quick freezing, high shrinkage analyses, and mold conditions resulting in rapid cooling. Standard remedy is to reduce spinning speed about 5 per cent which usually is effective. E. B.

HARD SAND MATCHES are used in every foundry at some time or other, and where the practice is common, usually a stock of a proprietary material is kept on hand for the purpose. However, in foundries where sand matches are used only occasionally there is great scrambling around and scratching of heads to devise a suitable mixture without delay. While numerous compositions have been suggested, an old-timer suggested the following: Portland cement 2 parts; plaster of paris 1 part; sharp sand 1 part. Mix with sufficient water to form a mud and pour into the match form on a well-greased pattern. Another handled like ordinary molding sand is composed of 89 parts finely sifted gangway sand, 1 part finely ground iron borings, 3 parts litharge, and 7 parts linseed oil.

Obviously the Best!

ROYAL BINDER

INCREASES OVEN CAPACITY
•
SAVES OIL
•
ADDS GREEN STRENGTH
•
REDUCES SMOKE
•
SAVES NAILS
•
SMOOTH TO WORK
•
SAVES CEREAL BINDERS
•
GOOD PASTING STRENGTH
•
EXCELLENT FACING ADMIX
•
INCREASING USER ACCEPTANCE

IF you want the binder that has everything—choose Royal Binder. In oil sand mixtures, it replaces part of the core oil—reduces your cost—develops green strength without sacrificing either transverse or tensile strength. Cores bake faster with less smoke and gas. Royal Binder is especially adapted for use as a facing binder. Cutting and scabbing when the molten metal contacts the sand are eliminated. This facilitates peeling, saves on cleaning costs and produces better finishes. Nailing of copes is held to a minimum or entirely eliminated. Tests have proven that Royal Binder makes a stronger core paste—requires less water to produce the proper consistency and therefore dries more quickly. It is the obvious binder to buy . . .

Try It in Your Foundry!

THE FEDERAL FOUNDRY SUPPLY COMPANY

Printed in U. S. A.

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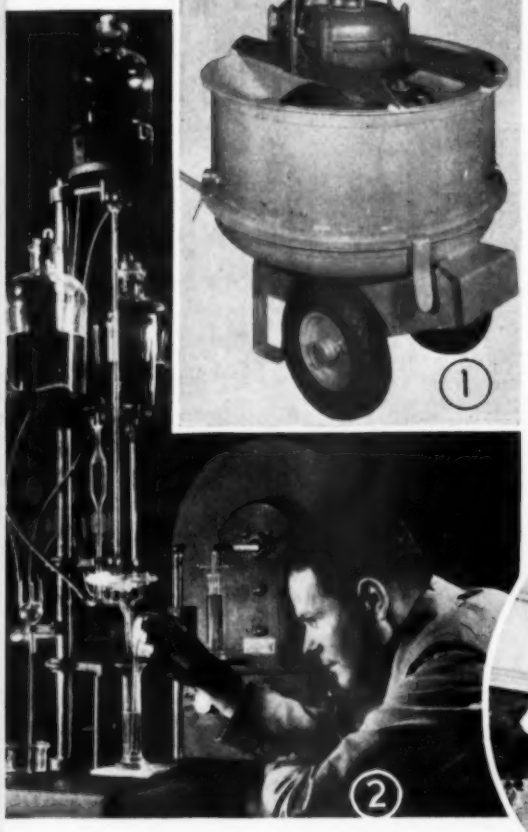
Seacoal Plant
CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • MINNEAPOLIS • NEW YORK • ST. LOUIS • RICHMOND, VA. • Mines UPTON, WYO.

NEW EQUIPMENT AND SUPPLIES

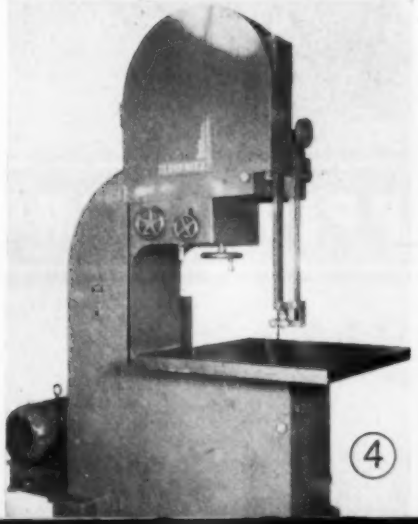
(1)—Sand Muller: Beardsley & Piper Co., 2541 North Keeler Avenue, Chicago 39, has developed a new portable sand muller especially adapted for use in small foundries but also useful for specific mulling needs in medium and large shops. Called the Mulbaro, the unit can be wheeled easily on its wheelbarrow base to any part of the foundry. In operation, sand first is shoveled into the barrow and wheeled to the top portion or mulling unit, which is suspended from a hoist. The mulling unit then is lowered, clamped to the barrow, the starter button is pressed and the mulling takes place. When the mulling is completed, the top portion is raised and the mulled sand wheeled away in the barrow. Since the mulling bowl is part of the barrow, use of a number of the barrows permits handling of a variety of sand mixes without contamination of one batch with another. Mulling action is accomplished by rubber-covered rolls. Batch size is 3 cubic feet.

(2)—Sulphur Determinator: Harry W. Dietert Co., 9330 Roselawn, Detroit 4, announces an improved 3-minute sulphur determinator for rapid and accurate sulphur determination of steel, iron, nonferrous metals, and materials such as coal and coke. The equipment is divided into two units, measuring burettes being mounted on one unit, and the other unit consisting of a stand and support for holding the solution vessel at the furnace. This arrangement speeds the operation since one sample may be in process of combustion while another is in process of titration. Sulphur percentage is read directly from the burette scale.



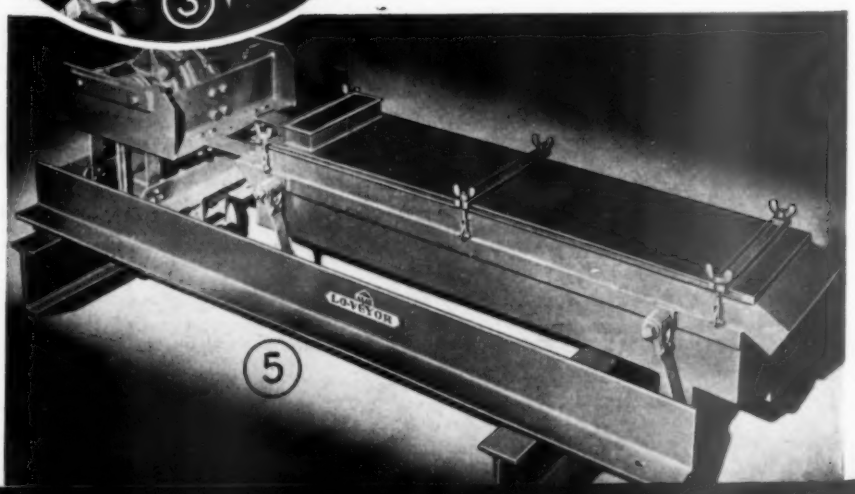
(3)—Goggles: American Optical Co., Southbridge, Mass., is offering two new models of acetate safety goggles made extremely light in weight without sacrificing strength. They are especially recommended for the worker whose skin is sensitive to metal goggle frames. The goggles have a strong, massive front, and the lens rim groove is deep to form a seat with substantial backing to resist impact. The bridge is made of extra heavy stock, and the nose pads have well rounded edges and ample flare to withstand blows. One model is available in a pink crystal color with white or Calobar lenses. The other, fitted with side shields, comes in a pink crystal color with white lenses, or in a green color with Calobar lenses.

(4)—Band Saw: Tannewitz Works, Grand Rapids, Mich., has added to its line a new heavy-duty, single high-speed machine designed specifically for cutting off gates and risers from extra heavy magnesium and aluminum castings. It is made with heavy welded steel frame and wheels, and built throughout to handle the most severe requirements encountered in sawing nonferrous materials. Among its design features is an automatic cut-out which stops the machine when the saw blade becomes overloaded.



(5)—Shot Reclaimer: Ajax Flexible Coupling Co., Westfield, N. Y., announces a standardized shot reclaiming screen used for separating shot into coarse and fine grades for cleaning operations in centrifugal and compressed air blast machines. It is said to speed up blasting of heavy work by screening out the fines, thus eliminating cushioning action. Smaller grit sizes below No. 45 are ideal for blasting fire heat-treated parts. The unit is compact, self-contained and easily installed. All rotating

(*Continued on page* 202)



SPECIMEN PREPARATION

made easy with precision built Buehler METALLURGICAL TESTING EQUIPMENT

WET POWER GRINDER NO. 1215

for coarse and medium-coarse grinding

The entire side surface of the 12 inch wheel is exposed for grinding; thus giving a wide range of surface speeds. A specially designed guard provides adequate protection to the operator without restricting the area of grinding surface. Housed in the base is a self-contained recirculating cooling system that supplies a soluble oil coolant independently to each wheel. The oil coolant also serves to prevent rusting of machine parts and specimens. An outstanding feature of this machine is the freedom from oscillation and vibration. Buehler equipment is noted for its smooth running qualities that are the result of precision built parts and carefully engineered construction.

A complete line of equipment for specimen preparation available from one reliable source

Cut-off Machines • Specimen Mount Presses • Power Grinders • Emery Paper Grinders • Hand Grinders • Belt Surfacers • Polishers • Polishing Cloths • Polishing Abrasives

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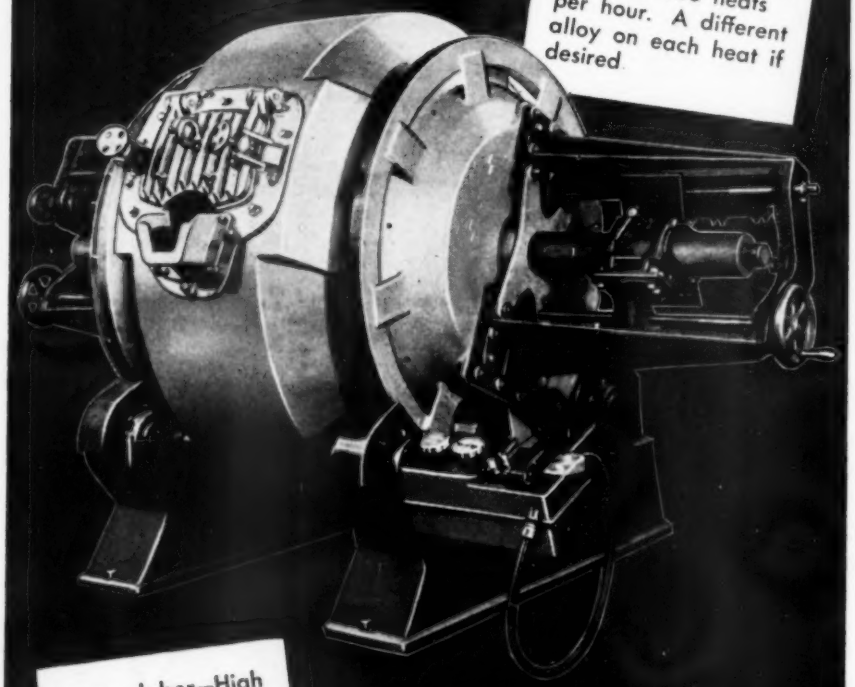
There are many advantages to a Detroit Rocking Electric Furnace

Tested and Proven—For 25 years—Over a thousand installations operating throughout the world.

Versatile—In highly successful use for most commercial alloys—ferrous and non-ferrous.

Fast, flexible, efficient—One to two heats per hour. A different alloy on each heat if desired



Saves labor—High rate of production per man hour

Saves fuel—No fuel to handle or store Highly economical in the use of electric energy

Saves metal—Lowest metal losses in melting. Utilizes salvage materials direct in foundry charges

For all around economy and better quality you can't beat a Detroit Rocking Electric furnace. Available in a variety of capacities from 10 to 8,000 lbs. Write us today for further facts.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

parts of the shot reclaiming, screening unit are completely enclosed and run in oil.

Iron Cement

So-Lo Works, Loveland, O., announces a new cement, called Fix-Iron, said to be effective for repairing broken, cracked, or defective cast or rolled metal. It also can be used on wood. The product comes in powdered form, and when mixed with water is applied like putty. Coefficient of expansion is said to be the same as that of iron. After drying the material may be filed or sanded.

Car Unloader

Cleveland Formgrader Co., 6723 Denison avenue, Cleveland, is offering its Moto-Heaver for the unloading of bulk materials from freight cars. When used

to unload a car of sand, as shown in the accompanying illustration, it is said to effect a 50 per cent saving in man-hours ordinarily required. The equipment is portable and is available in three sizes. It is powered by electric motor or gasoline engine and can be moved from one spot to another quickly and easily.

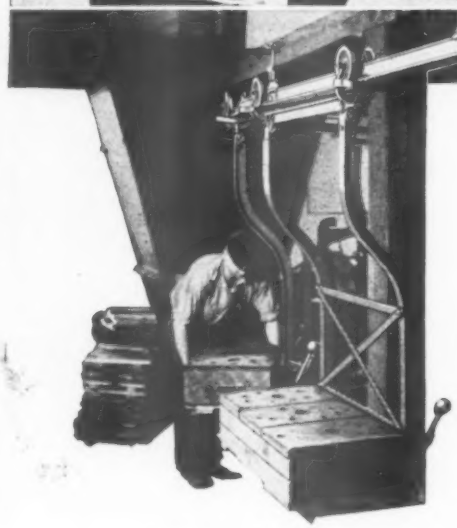
Corebox Protector

Carboloy Co. Inc., 11141 East 8 Mile Road, Detroit, reports a new use for its fish rod guide rings. When attached to the bottoms of aluminum coreboxes they prevent wear of the box caused by the abrasive action of the sand as the box is rubbed across the bench to smooth off bottoms. One foundry is said to have increased box life from 1500 cores to 9000, by use of the carboloy attachments, before overhauling due to excessive wear was necessary.

Gas Analyzer

Cambridge Instrument Co., Grand Central Terminal, New York, is offering a new gas analyzer for continuously recording on a single chart the amounts of carbon dioxide, carbon monoxide, oxygen and hydrogen in combustion processes. In all applications the results are recorded directly on a 10-inch strip chart without any corrections or inter-

(*Continued on page* 204)



Continuous Foundry System

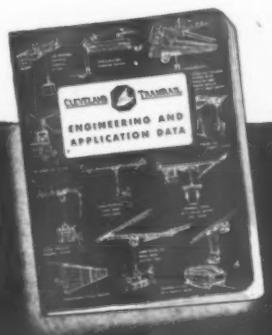
SPEEDS PRODUCTION — REDUCES EMPLOYEE FATIGUE — SAVES TIME — CUTS COSTS

From 50% to 75% of the usual handling of materials is eliminated with a Cleveland Tramrail Continuous Foundry System. The various foundry operations are so arranged that rack carriers travel on overhead rail from one operation to the other in logical order, and when the entire circuit has been traversed one or a number of castings have been completed.

Thus the carriers travel from the molding section to core-setting, to pouring, to cooling, and to shake-out, eliminating the need of carrying sand, flasks, molds, molten metal, castings, etc., to and from the usual pouring floor. After the carriers leave the shake-out area they continue to the molders and the cycle is repeated.

The elimination of so much handling saves time, speeds production and cuts costs. Employee fatigue is reduced greatly because of the reduction of handling and stooping, since the racks are built to the most convenient working height. Far less floor space is needed as the molds are kept moving and poured within a few minutes. Temperature loss of metal is extremely low because the metal is poured nearly as soon as it leaves the cupola.

Top photo illustrates an electrically-driven high-production system for large foundies. Illustration at left shows a simple hand-propelled system for small foundries. Cleveland Tramrail Continuous Foundry Systems have proven advantageous to foundries of all sizes.



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THE CLEVELAND CRANE & ENGINEERING CO.
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CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

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COPPER SHOT

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Any quantity, any size and prompt delivery . . . of course, "with proper priority."

SILVERSTEIN AND PINSOF, INC.

1720 ELSTON AVENUE
CHICAGO (22), ILLINOIS

(*Continued from page 202*)

polation. Four different registrations, one for each gas, are shown by different colors and numbers on the chart.

Refractory Coating

Neo Mold Co., 2183 East Eighteenth Street, Cleveland, has developed a new refractory coating for protecting foundry and heat treating fixtures against intense heat. It is said to be especially effective for application on magnesium and aluminum melting pots, core baking boxes, and loading racks for high-temperature furnaces, and to increase greatly the number of heats to which such equipment can be subjected before breaking down from oxidation and flaking. The coating is applied only in the company's Cleveland plant.

Paving Breaker

Syntron Co., 540 Lexington street, Homer City, Pa., announces a new style completely self-contained gasoline hammer paving breaker type demolition

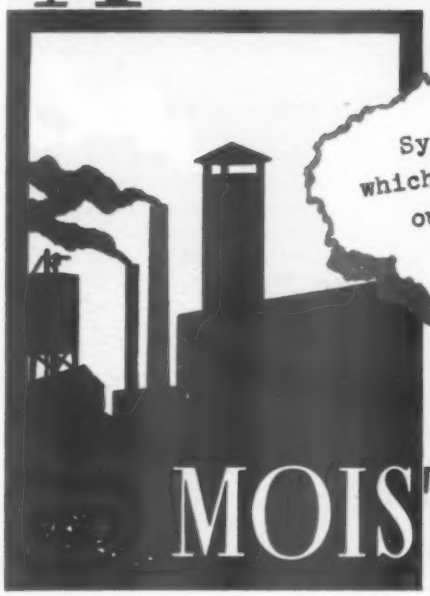
tool, weight 96 pounds, arranged for one-man use with moil points, narrow chisels, gads, wide chisels, frost wedges, clay spades, back fill tamping tools, asphalt cutters, sheathing drivers, ground rod driving tools, etc., with 1⅛ x 6-inch shanks. The device operates through an engine piston and a hammer piston. The engine piston is connected to the crank shaft at the top of the hammer and drives the flywheel ignition magneto and a fan for forced air cooling. The free hammer piston acts as a movable cylinder head for the engine piston. Each explosion drives it downward to strike directly on the shank of the tool. It is returned to the up or firing position by low pressure exhaust gas. Fuel, gasoline mixed with oil, consumption is stated to be relatively low.

Communication System

Talk-A-Phone Mfg. Co., 1219 West Van Buren Street, Chicago 7, has developed an inter-department communication system whereby the master station can

(*Continued on page 206*)

A Leading Foundry Research Metallurgist says:



"We think a great deal of the Kathabar System at our plant, and of all the cupola controls which we have, the humidity control is by far the most outstanding. This should be without doubt true of any industry using the cupola as a melting medium."

In Fact....

ALL KATHABAR USERS ARE ENTHUSIASTIC ABOUT THE RESULTS OF

MOISTURE ENGINEERING

● A manufacturer of cast iron pipe has been able to more accurately control the chill, therefore increase the uniformity of product, reduce the loss in silicon and manganese during melting, and increase the capacity of the cupola.

A manufacturer of malleable castings has been able to eliminate the big variable of outside humidity to obtain a more uniform product, and improve the annealing of the castings.

Manufacturers of cast piston rings are controlling the chill, reducing the time and material losses in machining, and improving the uniformity and quality of their products.

It is true that there are benefits for any industry using the cupola as a melting medium. You should know these details—how the Kathabar System can help you in getting more and better metal from your cupola operation.

Request the booklet, "The Effect of Moisture in the Manufacture of Metals", by returning the coupon. Let us explain the details of the Kathabar System of moisture control—available now for Foundry installation.

EXTREMELY COMPACT
EASY TO INSTALL
ANYONE CAN OPERATE
MINIMUM MAINTENANCE
LOW INITIAL COST

SC Kathabar System of MOISTURE CONTROL FOR CUPOLA DRY BLAST

WHITING CORPORATION

15607 LATHROP AVE.
HARVEY, ILLINOIS

☐ *Please send complete details on Kathabar Systems for Cupola operation.* ☐ *Send booklet, "The Effect of Moisture In The Manufacture of Metals".*

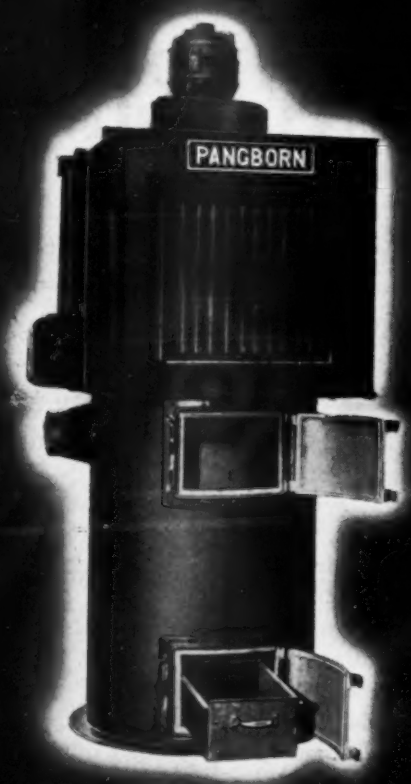
NAME..... TITLE.....

COMPANY.....

CITY..... STATE.....

« PROTECTION FOR PRODUCTION »

Something new in Dust Control equipment. A Unit Type Dust Collector of rugged construction for industrial applications, based on Pangborn's 40 years experience in solving dust problems throughout industry.



A FEW OF THE MANY NEW FEATURES

- Self-contained. Occupies minimum floor space.
- Flexible in arrangement to permit adaptation to variety of field conditions.
- Easily accessible for inspection, servicing and adjustment.
- Minimum piping and installation expense.

Arrangement details, operating data and photographs are available in Bulletin No. 910. A copy will be sent to you upon request—no obligation, of course!

ARMY E NAVY

PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

(*Continued from page* 204)

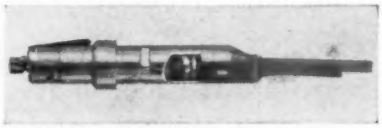
communicate with any one of up to ten substations without going through the central switchboard. An auxiliary feature permits amplification of calls to substations where a high noise level prevails. Privacy earphone, with independent volume control, also is available.

Friction Clutch

Dodge Mfg. Corp., Mishawaka, Ind., is offering a disc clutch in two sizes: ½-horsepower and 1 horsepower at 100 revolutions per minute. Instead of toggles the clutch contains a number of hardened steel balls which are forced into a v-shaped groove by a hardened steel cam. Forcing the balls toward the center of the shaft widens the groove. This produces a heavy power transmitting pressure on the friction surface. The clutch has no links, pins, cotters or other highly stressed mechanical parts to break or wear out.

Pneumatic File

Keller Tool Co., Grand Haven, Mich., has added a new pneumatic filing machine to its line for doing fine finishing filing. It also can be used as a portable



power saw for making irregular saw cuts by substituting a hack saw blade for the usual file. The tool is made in one size with a free speed rating of 1500 strokes per minute and with a fixed length of file stroke of 7/16-inch.

Insulating Varnish

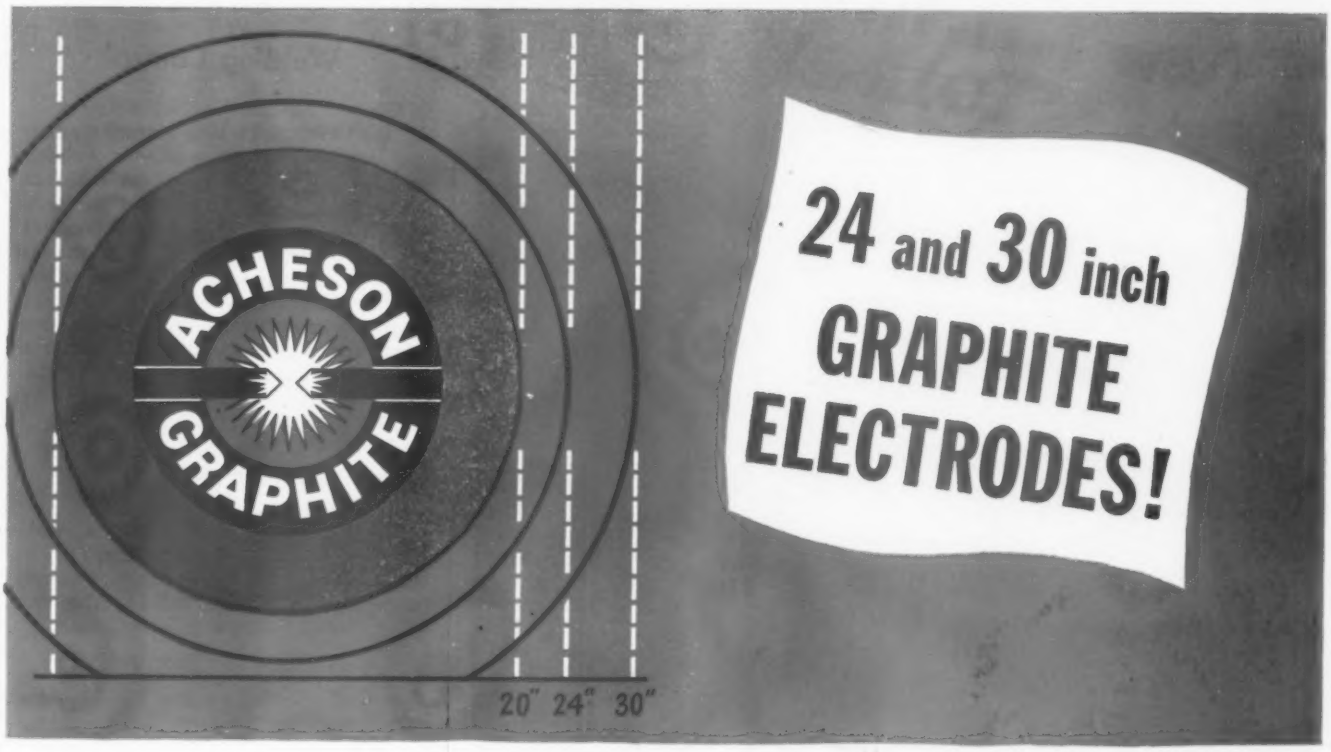
Sterling Varnish Co., Ohio River boulevard, Haysville, Pa., announces a group of air-drying, insulating varnishes for use in manufacture and repair of electrical equipment. They are said to dry rapidly to a smooth finish, to be oil-proof, and highly resistant to water, acid and alkali, as well as possessing high dielectric qualities.

Steel Grab

Mine Safety Appliances Co., Braddock, Thomas and Meade streets, Pittsburgh, has developed a steel grab for handling steel plates or structural forms in various shapes and sizes in thicknesses up to ⅝-inch, and in weight up to 3 tons. When the grab is hooked and pressure applied, two powerful many-toothed jaws close securely on the sheet and hold it tightly. Operating on the principle of a pair of tongs, the heavier the load, the tighter the grab. Simple

(*Continued on page* 208)

THEY'RE HERE RIGHT NOW...



TWENTY-FOUR and thirty-inch graphite electrodes for electric furnaces are now an accomplished fact. They are the first of such large sizes . . . and another in National Carbon Company's impressive list of "firsts" in carbon and graphite electrode development.

Long experience and extensive technical knowledge enabled National Carbon to make these new electrodes. This same experience and knowledge have brought about other outstanding developments in the highly specialized field of electrode making—for example, a special dense type "Acheson" electrode first made in 1922... the first 18-inch graphite electrode, in 1927... the introduction in 1928 of graphite nipples to improve the joints of carbon electrodes... the first tapered graphite nipples, in 1932... and the first 20-inch graphite electrode in 1938.

While electric steel furnaces large enough to require the 24 and 30-inch graphite electrodes do not exist, the electrodes for them are here right now . . . ready for industry.

The trade-mark "Acheson" and the "Acheson" Seal distinguish products of National Carbon Company, Inc.

NATIONAL CARBON COMPANY INC.
Unit of Union Carbide and Carbon Corporation
UCC
ELECTRODE SALES DIVISION, New York 17, N. Y.
Niagara Falls Cleveland Detroit San Francisco
Pittsburgh Chicago Birmingham
In Canada: Canadian National Carbon Company Limited, Welland, Ontario

BUY UNITED STATES WAR BONDS

Look Into Everything ROLLER CONVEYORS Can Do . . . Ask STANDARD CONVEYOR

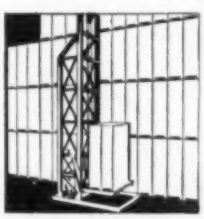
THE steps you take now — the investment in equipment that you may make to cut handling costs will not only pay dividends immediately but can be expected to yield equal or even greater returns in postwar days to come, when handling and other unproductive costs will be under the closest scrutiny.

For example, roller conveyors installed now will be useful in many ways no matter what you may be making or handling when peacetime is here. Roller conveyors are unequalled in low first cost, flexibility and minimum operating expense. They handle a wide range of commodities —parts, packages, units, cartons, cans, bottles, barrels, bundles, drums, boxes. They are available in light, average, or heavy-duty types for either portable or stationary use — in a wide variety of sizes, styles and lengths. Roller conveyors are built in their entirety by Standard, including the vital bearings which are manufactured to the highest standards.

Besides roller, Standard builds belt, chain, slat, and push-bar conveyors, also spiral chutes, tiering and lifting machines, portable pilers, and pneumatic tube systems.

On any conveyor requirement Standard Conveyor is equipped by experience and facilities to recommend and furnish the right type of equipment.

STANDARD CONVEYOR CO.
General Offices: North St. Paul, Minn.
Sales and Service in Principal Cities


TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS

(*Continued from page* 206)

principle of operation and quick method of attachment permit the use of the device for either lifting vertically or pulling horizontally.

Welding Control

General Electric Co., Schenectady, N. Y., has developed a new current-regulating compensator for resistance welding machines. It is designed to facilitate consistent welds by holding the true heating value of the weld current constant for any heat-control setting, without requiring continual manual adjustment. The compensator consists of an electronic control circuit which automatically retards or advances the firing point of the ignitron tubes used to control the welding current.

Small Ladles

Whiting Corp., Harvey, Ill., is making available on smaller sizes of its ladles many of the features formerly associated with large ladles. The unit

illustrated has a sturdy, insulated cover which swings horizontally to open. It also has improved trunnion bearings and a safety gear bracket for tilting. A 3-inch lining permits the user to keep metal hot for a longer period. This ladle is 22 inches long by 22 inches diameter, but it is available in various sizes.

Chip Breaker

Hammond Machinery Builders Inc., 1605 Douglas avenue, Kalamazoo, 54, Mich., announce a new heavy duty chip breaker and diamond finishing grinder, built to meet the requirements of production plants using large numbers of carbide tipped tools. A newly designed any-angle vise will handle all types of box and single point tools up to 2 inches and larger if required. Universal adjustments and direct reading type dials remove the guesswork from calibrating correct grinding angles. Grinding side is for use with either a 6 or 7-inch diameter cup wheel. The tilting table assembly is moved by screw adjustment. Table wall clearance per-

mits wheel changes without removing table assembly. A new safety cup disk prevents the operator from getting fingers or tools into cup wheel. Other features include ball bearing V-belt driven spindle for vibrationless grinding, and precision type spindle heavier than normally used for 6 or 7-inch wheel.

Enclosed Motor

Crocker-Wheeler Division of the Joshua Hendy Iron Works, Ampere, N. J., announces a new corrosion-resistant motor suitable for operation in atmospheres containing injurious dusts, corrosive vapors or excessive moisture. It is available in sizes from 1 to 15 horsepower for

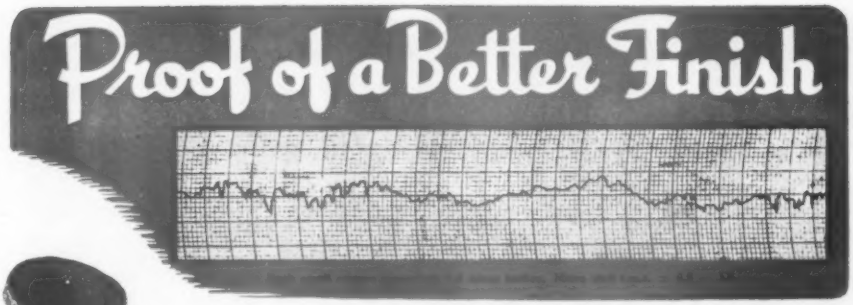
operation from any polyphase power supply. The motor is totally enclosed and fan cooled, but there are no cooling ducts to become fouled with wet or sticky dust. Coils are sealed by vacuum impregnation.

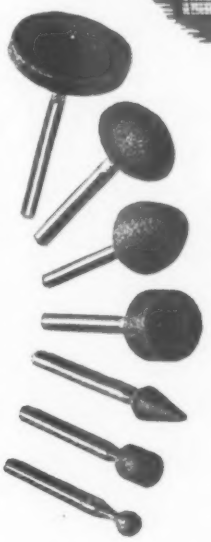
Rapping Plate

Kindt-Collins Co., 12651 Elmwood avenue, Cleveland, 11, has developed a new style master rapping plate for patterns claimed to be stronger, more economical and more efficient than others now in use. Advantages claimed for the new plate with tapered edge and screws driven at a slant include: Taper on the edge assures a tight driving fit; greater thickness gives greater contact surface on the wood for solid anchorage; diagonal screws give more holding power than screws driven in straight; longer screws can be used; longer life from malleable iron that will not bend or break. In the event that the screws work loose through continued hammering, the old screws may be extracted, the rapping plate given a slight turn and a new set of screws inserted to anchor the plate again. The plates are available in seven sizes from 1 to 5 inches diameter and in thickness from 5/16 to ¾-inch.

Control Instruments

Wheelco Instruments Co., Harrison and Peoria streets, Chicago 7, announces a line of instruments to enforce any desired heating or cooling program regardless of changes in temperature desired. The temperature cycle desired





Surface Analyzer Tape Proves you Get a Better Finish with Chicago Wheels

These results were obtained at a rate of 10 pieces per hour in an aircraft parts plant. Material, X-13-15, Rockwell 60 to 57, grinds out .006 to .007 stock. Chicago Wheel used, ½ x ½ x ⅛", Grain 180, Grade L Arcite FV Bond. Spindle Speed 40,000 r.p.m. Lapping and super finishing eliminated on this job.

Can you match that finish? Sounds phenomenal, but you can do it with Chicago Wheels. And, the secret of their superiority lies in the new FV Bond, developed exclusively for Chicago Wheels, after 50 years' experience making wheels for the most accurate and precise applications.

Here's What FV Bond Will Do for You

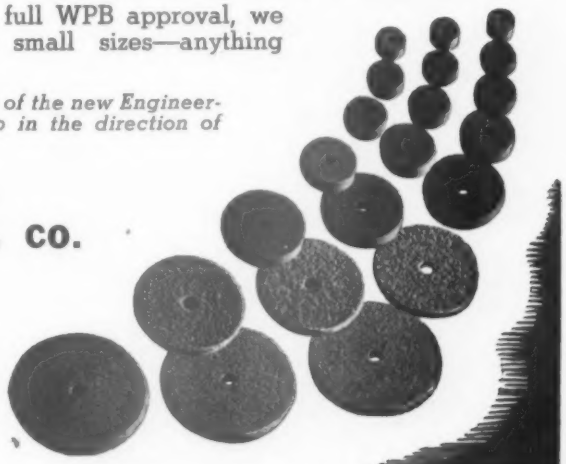
- Reduce your wheel costs
- Produce a better finish without sacrifice of production time—a finish so smooth that you can measure it in micro inches.

TRIAL WHEEL FREE

Write or send the coupon today for a Chicago Wheel, made with this remarkable new FV Bond. Tell us grinder you use, size wheel and kind of material on which you will make your test.

For the duration, with full WPB approval, we are specializing on small sizes—anything up to 3" in diameter.

Write for Catalog and one of the new Engineering Survey Forms, a step in the direction of better finishing.



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America's Headquarters for Mounted Wheels and Small Grinding Wheels

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Half a Century of Specialization has Established our Reputation as the Small Wheel People of the Industry.

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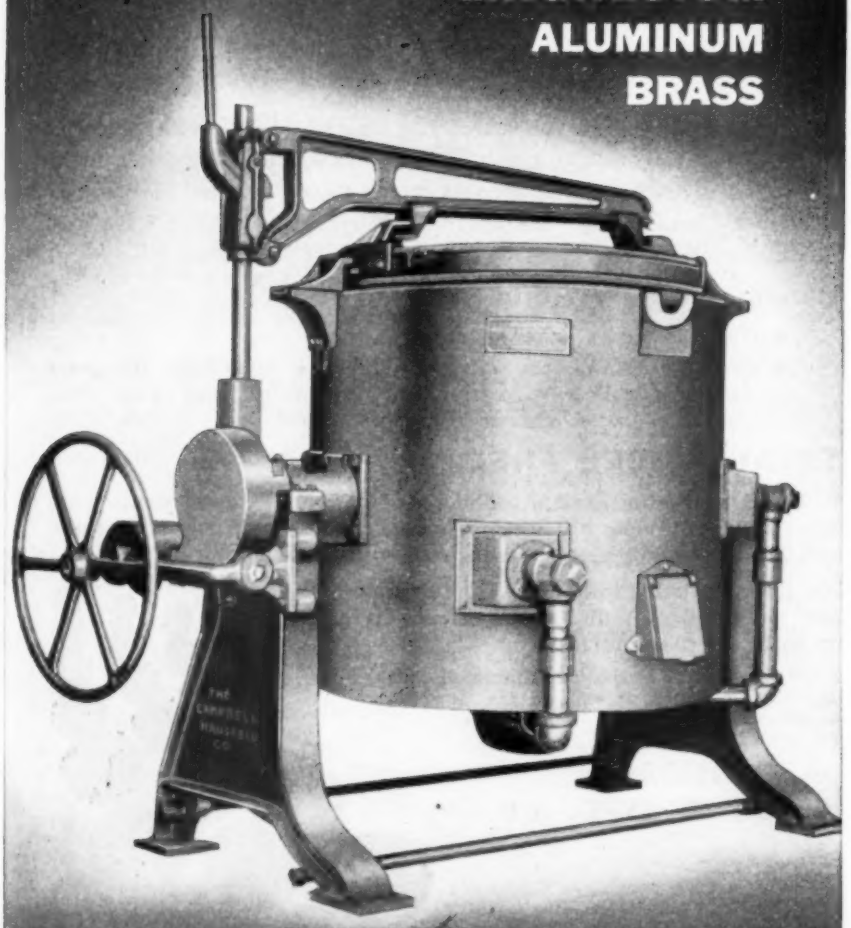
ALUMINUM
BRASS



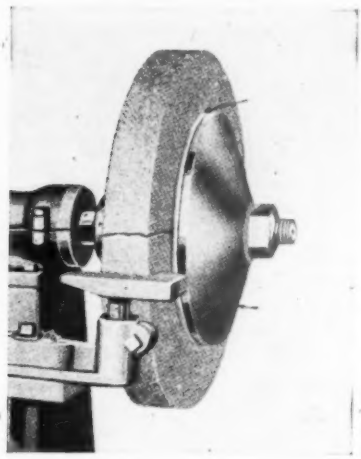
Built for Service

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

is cut on a disk. Rotation by a synchronous motor moves the temperature setting lever. Instruments are offered in 25 models, ten for proportioning control and others for two position, one-off and three-position on-intermediate-off control for high and low temperature applications. Thermometer models are available in recording and indicating types.

Safety Washer

Industrial Products Co., 2820 North Fourth Street, Philadelphia, announces safety washers designed to prevent accidents due to broken segments of a grinding wheel leaving the shaft. They consist of 20-gage steel disks, to one side of which a rubber surface has been



vulcanized. The disks are applied to each side of the grinding wheel, and when tightened the rubber is forced into the porous surface of the wheel to hold it firmly in place. Washers are available for wheels having flanges up to 30-inch diameter.

Tipped Tools

Haynes Stellite Co., Kokomo, Ind., announces two new styles of tipped tools. They consist of a cutting tip of stellite 98M2 cobalt-base alloy brazed or butt welded to a tough steel shank, with proper clearance and lead angles for turning steel. One is a right-hand tool, the other left-hand, and five sizes of each tool are stocked.

Industrial Scale

Detecto Scales Inc., 1 Main street, Brooklyn 1, N. Y., has added a new industrial fan scale to its line of weighing equipment. It is made with the reading dial at one end of the base, the commodity platter at the other end, and the weight plate in the middle. This permits all three vital points concerned with the weighing to be in direct

(*Continued on page* 212)

Air where you need it...

Schramm compressor installation operating in booth 217, A.F.A. convention, Buffalo, New York

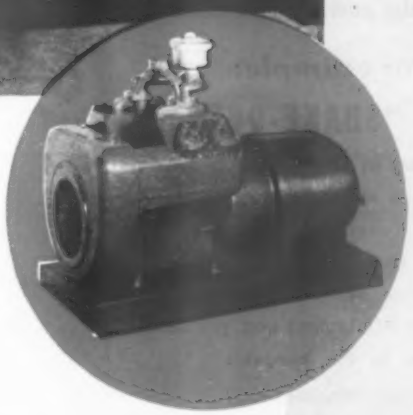
INSET

SCHRAMM MODEL No. 210

Schramm compressor installation operating in booth 219, A.F.A. convention, Buffalo, New York

INSET

SCHRAMM MODEL W D 50



AT THE LEAST POSSIBLE COST, WHEN YOU USE—

Schramm

It has again been our good fortune to have had Schramm equipment selected to supply the air for all exhibit operations at the annual A.F.A. convention in Buffalo.

Since 1934, Schramm equipment has been performing this service for foundry exhibits, enabling visitors to study our efficient compressors operating under regular foundry working conditions. These compressors are so compact and smoothly operating that no special foundations are necessary. Their many points of advantage are worthy of your consideration. Uniform cooling, greater capacity in restricted area and excellence in design. Built in a variety of sizes to meet any requirement, Schramm equipment can assist you in meeting your air problems with ECONOMY, EFFICIENCY and DEPENDABILITY. May we send you our catalog 42-S.

SCHRAMM

Air Compressors

SCHRAMM, INC., WEST CHESTER, PA.

THE COMPRESSOR PEOPLE

Save WITH JIB CRANES

on Point-of-Operation Jobs . . .

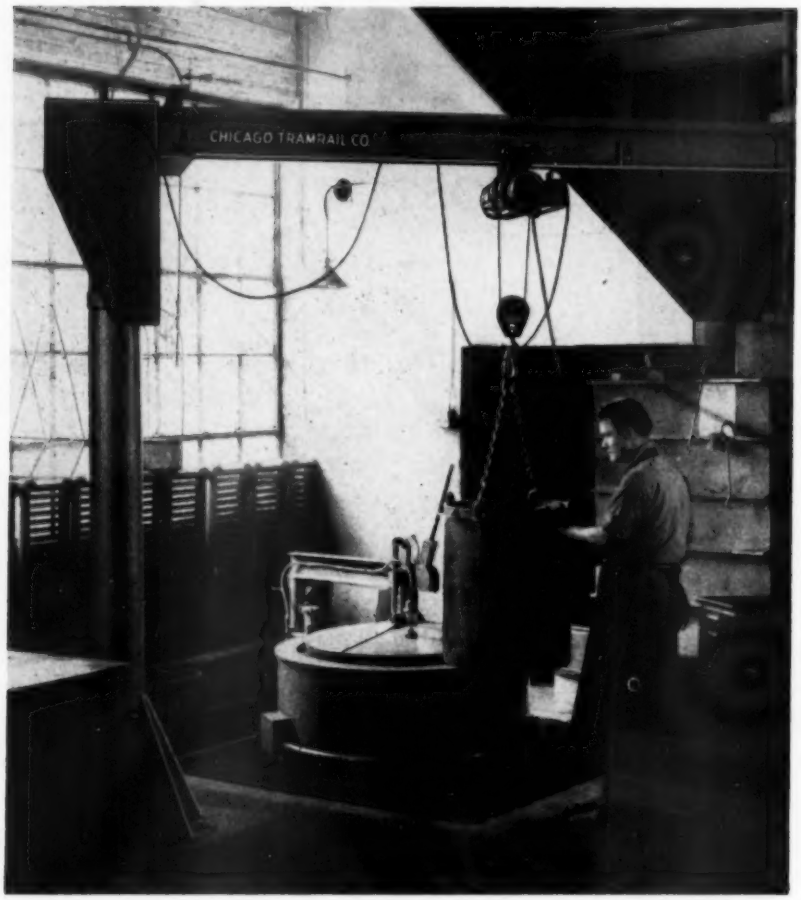


Photo Courtesy of Accurate Spring Co., Chicago, Ill.

Through the simple expedient of installing a Jib Crane at this heat-treating point of operation, one man is able to lower the container into a pot type furnace. Then, with extreme ease, the container may be lifted and swung around to the oil drench at the left. There are other points of operation in foundries where Jib Cranes will speed handling, save on help and reduce costs.

PILLAR TYPE NO. 541

A rigid, strongly welded, heavily bolted, self-supporting Jib Crane with 360° complete circle swing. One-half to 2-ton capacities with radius ranges up to 20 ft. Three-ton capacity up to 15 ft. radius. Hand operated or electric hoist.

for example:

at the "SHAKE-OUT"...

Operating at 360° complete circle swing, these nimble cranes take the load from overhead cranes which converge at the "shake-out". No costly tie-up or wear and tear of heavy duty equipment and you save man-power in the bargain.

Write today for Jib Crane circular. No obligation.

CHICAGO TRAMRAIL COMPANY

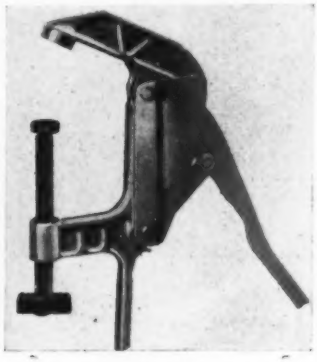
2910 CARROLL AVE. Phone KEDzie 7475 CHICAGO, ILL.

(*Continued from page* 210)

line of vision with the operator. The scale is available without beams for direct weighing purposes where weights are employed. A choice of five standard dials is offered from 1 pound x 1/100-pound dial to a 1000 gram x 5 gram dial. Special dials are made for specific purposes.

"C" Clamp

Knu-Vise Inc., Detroit, announces improvements in its "C" clamp to incorporate greater strength, added throat capacity, and 17 per cent weight reduction. The resulting better balance makes



for greater ease of handling, and the increased throat capacity enables it to accept a wider range of work. A wing nut replaces the knurled head on the spindle which adjusts the gap for the required thickness of the work. Once adjusted, the clamp remains at that setting.

Graphite Electrodes

National Carbon Co. Inc., New York, has developed two new and larger sizes of graphite electrodes 24 and 30 inches in diameter which are claimed to be the first of those sizes produced commercially anywhere in the world. Major problem in increasing size without sacrificing other desirable physical properties was strength, and it is said that the new electrodes are proportionately as strong as the widely used 18-inch diameter electrodes.

Air Filter

Dollinger Corp., 11 Centre Park, Rochester, announces a new viscous panel filter for use in ventilation and air conditioning systems where filter resistance up to about 0.60 inch of water is permissible. The filtering medium, consisting of a series of crimped layers of galvanized screen cloth and woven copper mesh, is coated with oil, and is arranged within the metal cell to provide large dirt-holding capacity. Cells are of 16-gage steel, finished with corrosion-resisting paint and fitted with

(*Continued on page* 214)

IS ALWAYS OPEN TO YOUR EMERGENCY NEED

AS WELL AS REGULAR REQUIREMENTS

This is a restatement of a policy. There is nothing new about it. Yet the importance of emergency service on ferro-alloys is of great value particularly during essential wartime demand. Ohio Ferro-Alloys adherence to the meeting of rush requirements but with few exceptions due to unusual conditions, has served to overcome shut-downs or probable reduced operations and helped for immediate development needs. That's the way the Ohio Ferro-Alloys Corporation is known—a dependable source plus helpful service with a "production man's" interest and experience.

PHILO BRAND — DEPENDABILITY · QUALITY · SERVICE

RAINIER BRAND — DEPENDABILITY · QUALITY · SERVICE

Ohio Ferro-Alloys Corporation

Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

FERRO-SILICON 50%, 75%, 85%, 90%

FERRO-CHROMIUM • FERRO-MANGANESE

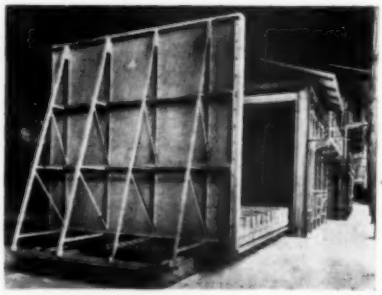
BOROSIL • SIMANAL

BRIQUETS

OFA SILICON, MANGANESE, CHROME

Built to Handle Foundry "Pay-Loads" FASTER!

The two furnaces pictured above provide typical advantages of VULCAN-engineered installations . . . maximum capacity, a shorter over-all treatment cycle, complete control, and important savings in operation and maintenance. Direct fired furnace (left) is used for annealing and normalizing miscellaneous castings, at temperatures up to 1800° F. Convection furnace (right) operates at a maximum of 1150°F., for stress relief of castings and weldments. Each is equipped with complete program control, including rates of heat rise and cooling; motorized car and door; and transfer car control. Oil fired, but can be arranged for gas firing with assurance of equally efficient operation.



Setting the Pace for Both Size and Efficiency . . . .

Illustrations at right show two VULCAN furnaces built to handle exceptionally large, heavy charges. Upper-Car hearth furnace for annealing and normalizing large castings and weldments. New method of direct firing produces a convection-effect. Lower-Car hearth furnace for annealing, normalizing and stress relieving large marine castings and weldments. Direct fired, with improved oil circulating system. Temperature range: 700°F. to 1800°F. Two-zone control.

In furnaces, its the engineering *that counts. The outstanding success of VULCAN installations in many important war production plants is proof of the skill and experience of VULCAN engineers. Consultation will incur no obligation.*

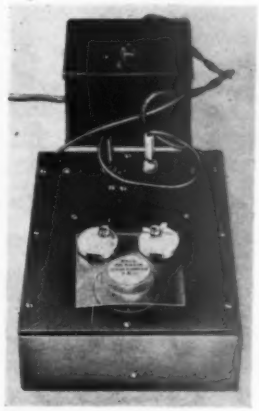
VULCAN CORPORATION
1797 CHERRY STREET, PHILADELPHIA, PA.

(*Continued from page* 212)

handles and latches which hold the cell tightly in box type supporting frame. Frames can be riveted together to form a flat bank or arranged in series of "V's" to give maximum filter capacity for any given space.

Metal Marker

Acme Metal Marking Equipment Co., 2222 West Fort street, Detroit 16, announces a new electrolytic method of marking metal, yielding 1200 to 1500 impressions per hour without the use of acid. It consists of a compact unit 2 x 6 x 9 inches with a 110-volt alternating-current transformer. A drop of conductive solution, good for 500 impressions, is applied to a silver pad on which rests a celluloid stencil engraved



with the mark to be etched. The part to be marked is placed on the stencil in contact with adjustable guide posts. When the current is turned on one second is sufficient to produce a permanent mark. Two models are available, one for marking at surfaces, the other for marking round parts.

Weld Electrode

Wilson Welder & Metals Co. has developed a new coated aluminum bronze electrode for welding most bronzes, malleable iron, cast iron and steel. It is claimed to provide weld deposits of great strength and hot ductility combined with desirable resistance to corrosion. Sizes from ⅛ to 3/16-inch in 14-inch lengths and ¼-inch rod in 18-inch length are standard while sizes from 5/16 to ½-inch in 18-inch lengths may be obtained on special order.

Protective Cream

Turco Products Inc., Los Angeles and Chicago, is marketing a cream for protection of hands and arms against penetration of grease, paint and dirt into the pores of the skin. A smooth, white cream which dries into an invisible

film, it is easily rinsed off with water taking away adhering materials. It also is claimed that the cream reduces the stinging and smarting effect of many industrial solvents on the skin.

Radial Saw

J. D. Wallace & Co., 157 South California avenue, Chicago, announces an improved model radial saw used for cutting wood and nonferrous metals such as aluminum and copper, using toothed saw blades. The column, arm and motor all are radially mounted, rotating 360 degrees and capable of being locked in any position. An accessory incorporates two adjustable stops which position the machine to make any two angle cuts alternately on a piece of material before removing it from the table.

Rotary Files

Heller Bros. Co., Newark, N. J., now is marketing a complete line of hand cut rotary files for use on flexible or stationary shaft filing machines, portable electric and air tools and similar devices. These files are obtainable in flame, ball, cone, tree, oval, cylindrical, tapered and other shapes. Each shape is available in a number of sizes, as well as in rough, coarse, fine and smooth cuts.

Welding Electrode

Eutectic Welding Alloys Co., 40 Worth street, New York, has placed on the market a new coated electrode for welding aluminum alloy castings and sheet by the electric arc process. It is claimed that in the case of castings that metal may be added without completely preheating the piece. Applications include correction of improperly machined castings, correction of patterns, salvaging defective work, and joining castings to other fabricated parts. Electrodes are available in ⅛, 5/32 and 3/16-inch sizes.

Sealing Compound

Ault & Wiborg Division, Interchemical Corp., Cincinnati, has developed a synthetic resin which in combination with monomeric styrene is claimed to give excellent results for sealing porous aluminum, magnesium and other types of castings. With fine porosity the usual proportion of resin to styrene is 40 to 60 while in the case of coarse porosity the ratio is 60 parts resin to 40 parts styrene. Sealing procedure is by impregnation; the castings being placed in an autoclave, the air evacuated, the compound admitted, and the whole then subjected to 90 pounds per square inch air pressure. Castings are allowed to drain, and excess compound is removed with kerosene or stabilized cleaner. The compound is polymerized by bak-

Time Saving Methods Cut Costs for Users of ACME CASTINGS...

These workmen, pouring the core for an aircraft cylinder head aluminum casting, typify the cost-saving skill and precision prevailing throughout the Acme foundry.

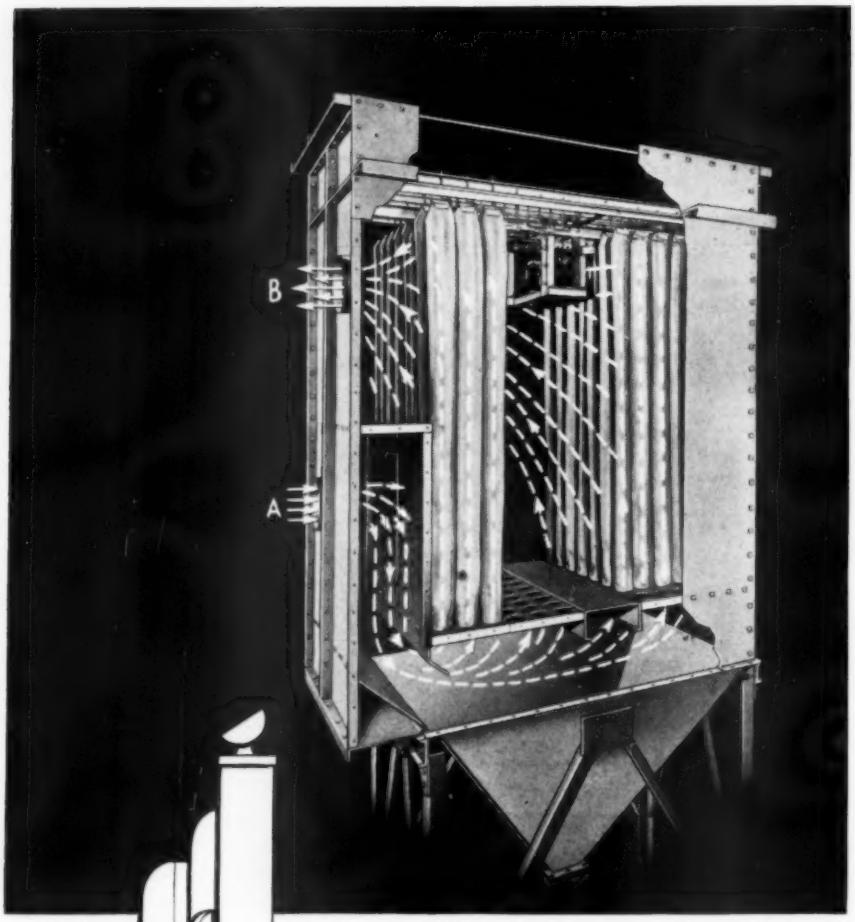
A specially developed Acme technique of pouring directly in the core assembly for a cylinder head aluminum casting reduced the amount of metal used in pouring from 228 to 82 pounds—a big saving in metal as well as a saving in time. Such advanced methods, plus strict laboratory control and rigid inspection, insure the quality and value of every Acme Aluminum Casting.

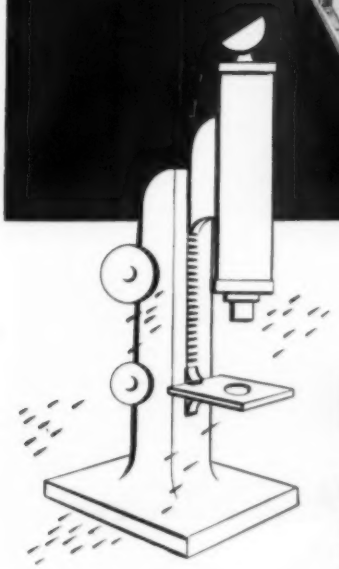
Acme complete service to the metal-working industry includes special tools designed to your requirements, and recommendations of Acme engineers. Your inquiry will receive prompt attention.

For Victory Buy War Bonds and Stamps

ACME Pattern and Tool Company, Inc.
DAYTON, OHIO

HEAT-TREATED ALUMINUM CASTINGS...PATTERNS...TOOLS
TOOL DESIGNING...PRODUCTION PROCESSING





Trapping an Invisible Enemy

DUST is the invisible enemy that causes excessive maintenance, slows down the productivity of workers and endangers their health. Whether you realize it or not DUST is costing you money—perhaps more than you think.

"Dustube" collectors filter the air at a rate from 270 C.F.M. to 47,000 C.F.M. and more, depending on your dust problem. They meet the most exacting requirements. Tests show collection efficiency by weight, 98% or more. Efficiency by dust count of filtered air*, less than 10 million particles per cubic foot of air from 2 to 10 microns in size.

The few moving parts of "Dustube" bag type collectors cut maintenance cost and simplify operation and inspection. A mechanical shaker gently frees dust particles from sides of cloth collection tubes and deposits them in hopper. Since tubes are never taut or in contact with metal sides, their life is long.

"Dustube" collectors combine the essentials of efficiency, simplicity, and low operating and maintenance costs, to give you the right answer to your dust problem. Write for further information.

Our experienced engineering staff is waiting to serve you. American Foundry Equipment Company, 505 S. Byrkit Street, Mishawaka, Indiana.

*Determined by impinger method.

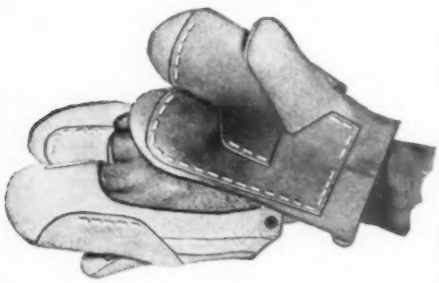
ARMY (E) NAVY

AMERICAN dustube dust collectors

ing for 2 hours at 275 degrees Fahr., preferably under 50 to 75 pounds per square inch air pressure. It is claimed that the resin cross-links with styrene during polymerization without use of a catalyst. Co-polymer resulting is gasoline and oil insoluble, will not exude, and will maintain sealing efficiency under operating conditions up to 300 degrees Fahr. for prolonged periods.

Hand Pad

Industrial Gloves Co., Danville, Ill., is offering a two-finger, open-back, work handler for general purpose protection to



the hands. It is made of chrome tanned cowhide split leather, and all seams are sewed with steel thread. It carries a double thickness wearing surface across the entire palm and over the side and back of the fore finger where most wear occurs. An adjustable fastener is located at the wrist.

Wage Calculator

Wage-Master, 1751 Belmont avenue, Chicago 13, is offering a payroll calculator which automatically computes any wage-hour payroll calculation. It also includes a separate withholding tax calculator. The unit shows: Wages at straight time; premium wages; wages at time and one-half for more than 40 hours, and total wages earned. Provision is made for 234 pay rates from 30 cents to $2.12½ per hour, and for time from one-tenth of an hour to 64.9 hours.

Output of Aluminum Castings Rises

Production of aluminum castings in January totaled 22,075 tons, compared with 20,691 tons in December and 16,542 tons in January, 1943, according to the War Production Board. Total output for the latest month reported included 14,703 tons of sand castings and 4180 tons of permanent mold castings, the balance being die castings. For all types production was the largest recorded for any month to date.

Ansul Chemical Co., Marinette, Wis., has opened a new office in New York at 60 East Forty-Second Street.

TAM ZIRCONITE PRODUCTS AVAILABLE

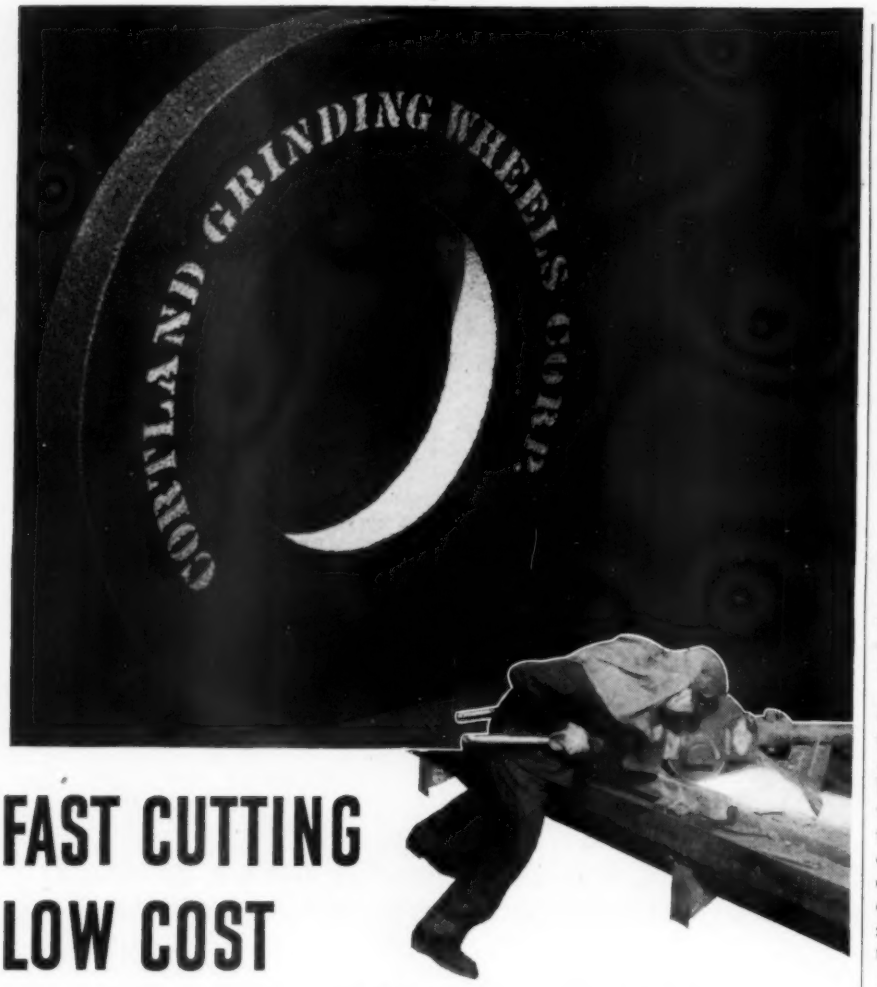
TAM
Foundry Zirconite Sand (in three grades)
Melting Points from 3650° F to 3950° F

TAM
Foundry Zirconite Flour (in two grades)
Melting Points from 3650° F to 3812° F

TAM
Foundry Zirconite Mold and Core Washes (in three grades)
Super-refractory compounds with melting points from 3600° F to 3775° F

GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY

Representatives for the Pacific Coast . . . BALFOUR, GUTHRIE & CO., San Francisco, Los Angeles, Portland, Seattle, Tacoma
Representatives for Canada . RAILWAY & POWER ENG. CORP., Ltd., Toronto, Montreal, Hamilton, Winnipeg, Vancouver, Sydney
Representatives for Europe . . . . . T. ROWLANDS & CO., Ltd., 23-27 Broomhall St., Sheffield, England



FAST CUTTING
LOW COST

... use Cortland Wheels

The results you get from your Snagging operations—*and the costs*—are a matter of *combination*. Selection of abrasive, grain, grade, structure and bond, make Cortland Snagging Wheels outstanding for better ratio of stock removal to wheel wear.

Cortland Engineers will be glad to go over your Snagging requirements and make recommendations.

Write CORTLAND GRINDING WHEELS CORP., 6 Cortland Street, Chester, Massachusetts.

For Better Snagging

10

CORTLAND

(*Continued from page* 196)

John Bermingham, E. F. Houghton & Co., who gave a highly interesting and instructive illustrated talk on core binders. An extended question-and-answer period followed his discussion.—*George L. Kennard, secretary.*

New England

REGULAR monthly meeting of the New England Foundrymen's Association, held at the Engineer's Club, Boston, April 12, with nearly 100 members and guests in attendance, had John N. Ludwig Jr., Electro Metallurgical Co., New York, as its featured speaker. His subject was "Metallurgical Control in the Foundry."

Mr. Ludwig discussed the importance of proper selection of raw materials for use in a given process where a definite chemical specification in either steel or iron has to be met. The proper application of ferroalloys was pointed out as a necessary requisite in overcoming difficulties which develop in founding.

By a choice selection of lantern slides, the speaker showed the effect on the properties of steel by deoxiding with silicon, aluminum, and calcium, and the bearing of this deoxidation process on the melting of cast iron. In speaking of the cupola process, he stated that the silicon content of the base mixture has a direct effect on the total carbon content of the iron at the spout. The lower the silicon in the base charge the greater total carbon pick-up results.

Physical properties were discussed at length. In general, the tensile strength varies inversely as the carbon equivalent, the carbon equivalent being computed by the formula: C.E. = % Total Carbon + .3(% Si + % P). Also, in general the brinell hardness increases as the carbon equivalent. Inoculation effects the tensile strength favorably, giving less chill and greater tensile strength. Small chromium additions are made use of to offset the unfavorable effect of increase in carbon equivalent when silicon is used. Inoculation with S.M Z. alloy instead of with ferrosilicon results in less chill and greater tensile strength.

Many questions were asked and considerable discussion followed the address.—*Merton A. Hosmer, vice president.*

Northeastern Ohio

CLOSING meeting of the Northeastern Ohio Chapter for the 1943-44 season, held at the Cleveland Club on May 11, was the annual "Oldtimers" night. Approximately 300 members and guests were present, and of those 75 had served in the industry for 40 years or more. Twenty apprentices also were present. James G. Goldie, president of the chapter, announced that Ben D. Fuller, Whitehead Bros Co.; G. H. Zimmerman, Eberhard Mfg. Co Division, Eastern Malleable Iron Co., and J. V. Horning, Ohio Foundry Co.,

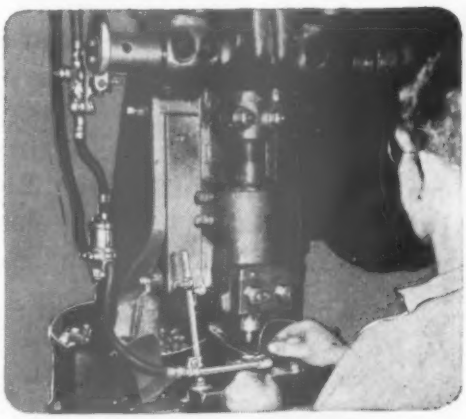
(*Concluded on page* 220)

what's a windmill got that you need?

The power of air at work, originally suggested by the windmill, becomes a modern and vigorous factor in industry when compressed air is controlled by proper equipment.

Schrader, pioneer in elimination of air losses through the principle of controlled intermittent blasts instead of constant flow, has designed and brought to you a modern and effective complete line of devices offered for the control and use of air. In fact, with Schrader Air Controls, it is often possible to extend the use of air to many more devices or machines than you now have in service *without* increasing your air compressor capacity.

Schrader Air Ejection Sets are practical examples of air-saving Schrader controls. These inexpensive standard packaged sets can be installed in a jiffy with a few simple tools. You can profit right away by increased safety, increased production and less fatigue. Look into Schrader Air Ejection Sets now; their low cost will surprise you! Write for Bulletin A-8Q.



Note how work is BLOWN into barrel.

SCHRADER AIR EJECTION SETS, operated from either cam or ram, are adaptable to many types of presses and machines, and adjustable for a wide variety of air ejection jobs. Designed for ease of installation and maximum economy of operation.

100th ANNIVERSARY 1844 1944

Air Valves 2, 3, 4-way • Machine Operating Air Controls • Quick-acting Couplers • Blow Guns • Safety Operating Controls • Air Ejection Sets • Hydraulic Gauges

ARMY NAVY E

MADE BY THE MAKERS OF SCHRADER TIRE VALVES AND GAUGES

Schrader

REG. U.S. PAT. OFF.

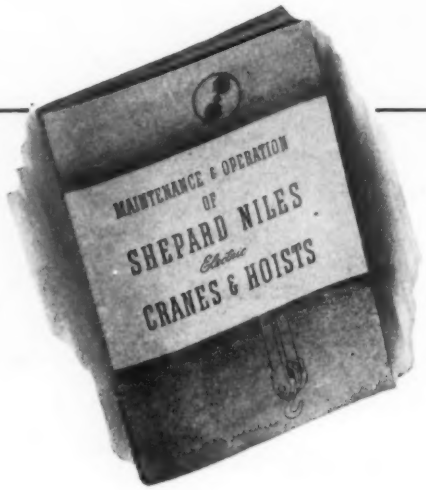
CONTROLS THE AIR

A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Incorporated,* **BROOKLYN, NEW YORK**

second call

FOR THOSE WHO MISSED OUR ORIGINAL OFFER TO SEND THE SHEPARD NILES MANUAL ON THE MAINTENANCE AND OPERATION OF ELECTRIC

cranes and hoists



BECAUSE the systematic and periodical maintenance and care of cranes and hoists is so very important today, we want to be doubly sure that you receive your copy of this manual, devoted to the Maintenance and Operation of Shepard Niles Electric Cranes & Hoists. If you missed our first offer, send for your copy *today*—you may need it *tomorrow*.

WRITE FOR YOUR COPY TODAY
YOU MAY NEED IT TOMORROW

106 pages—amply illustrated with sectional views and line drawings. . . . Covers the complete line of Shepard Niles Electric Cranes & Hoists. Sturdy, flexible cover. Special binding for easy opening. Convenient (7¼" x 10¾") size.

Shepard Niles
CRANE & HOIST CORPORATION

360 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

(*Concluded from page* 218)

had served in the foundry field for 60 years or more.

Prizes were presented to the winners in the local and national apprentice contests. Local prize winners included Stephen Krajny, Master Pattern Co.; Eugene Chmielowicz, Master Pattern Co., and Gabriel Gedeon, Western Patterns Works, in the patternmaking group, and George Jaros, Aluminum Co. of America; Robert Steinmetz, Cleveland Trade School, and Steve Vilk, Cleveland Trade School, in molding. Prizes in the national contest held at Buffalo were presented to George Jaros and Stephen Krajny, winners from the northern Ohio area.

President Goldie stated that since no further nominations had been proposed the slate of officers selected by the committee was open for balloting. Frank G. Steinebach, THE FOUNDRY, made a motion that the secretary be instructed to cast a unanimous ballot for the slate, and that was seconded. Mr. Goldie then announced that the following were duly elected for the ensuing year: President, Russell F. Lincoln, Russell F. Lincoln Co.; vice president, William G. Goebert, Bowler Foundry Co.; treasurer, F. Ray Fleig, Smith Facing & Supply Co., and secretary, Gilbert Nock, Nock Fire Brick Co. Directors for a 3-year term—Gordon B. Carson, Case School of Applied Science; Frank Weisehan, Ferro Machine & Foundry Co.; J. E. Dvorka, Eberhard Mfg. Co. Division, Eastern Malleable Iron Co.; Elmer Zirzow, National Malleable & Steel Casting Co., and Bert S. Parker, Youngstown Foundry & Machine Co., Youngstown, O.

Meeting closed with a floor show arranged by L. P. Robinson, chairman of the entertainment committee. — *Edwin Bremer, chairman publicity committee.*

Nominate Officers

Nominating committee of the American Society for Testing Materials met recently and selected the following nominees for next year: For president, P. H. Bates, chief, Clay and Silicate Products Division, National Bureau of Standards, Washington; vice president, Arthur W. Carpenter, manager, Testing Laboratories, B. F. Goodrich Co., Akron, O. For members of the executive committee: W. C. Hanna, chief chemist, California Portland Cement Co., Colton, Calif.; L. B. Jones, engineer of tests, Pennsylvania Railroad Co., Altoona, Pa.; James T. MacKenzie, chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala.; J. G. Morrow, metallurgical engineer, Steel Co. of Canada Ltd., Hamilton, Ont., and Sam Tour, president, Sam Tour & Co. Inc., New York.

New Representative

Ironton Fire Brick Co., Ironton, O., has appointed Firegan Sales Co., 4040 Board of Trade building, Chicago, as sales representative in Illinois, Indiana, Iowa, Minnesota and Missouri.

Nonferrous Founders Elect Officers

Roy M. Jacobs, president, the Standard Brass Works, Milwaukee, was elected president of the Non-Ferrous Founders' Society at the organization meeting of its new executive committee following the close of the society's third annual meeting at Buffalo, April 24. In addition, Edwin W. Horlebein, president,

ROY M. JACOBS

the Gibson & Kirk Co., Baltimore, was named vice president, and Richard M. McClure, Chicago, secretary-treasurer.

The 1944-45 executive committee is composed of: Chester K. Faunt, Christensen & Olsen Foundry Co., Chicago; L. M. Nesselbush, the Falcon Bronze Co., Youngstown, O.; A. M. Cadman, A. W. Cadman Mfg. Co., Pittsburgh; Thomas S. Hemenway, Metal & Alloy Specialties Co. Inc., Buffalo; Thomas H. Addie, American Manganese Bronze Co., Philadelphia, Mr. Jacobs and Mr. Horlebein.

Members of the executive committee and the following make up the board of directors: G. B. Hazen, Brass Foundry Co., Peoria, Ill.; C. H. Stokesbury, Derby Castings Co., Seymour, Conn.; J. F. Gilbert, Gilbert Brass Foundry Co., St. Louis; J. J. Nelson, Cramp Brass & Iron Foundries Division, Eddystone, Pa.; J. A. Duncan, Wm. Duncan Co., East Boston, Mass.; W. E. Paulson, Thomas Paulson & Son Inc., Brooklyn, N. Y.; Louis Fischer, Fischer Casting Co., Plainfield, N. J.; Fred Haack Jr., Capital Brass & Aluminum Foundry Co., Chicago; F. S. Wellman, Wellman Bronze & Aluminum Co., Cleveland; Oscar Swangren, Dorchester Brass & Aluminum Co., Hyde Park, Mass.; F. A. Mainzer, Pacific Brass Foundry of San Francisco, San Francisco; Charles Wegelin, Dixie Bronze Co. Inc., Birmingham, Ala.

Thomas S. Hemenway, chairman of the membership committee, reported at the meeting that the society had reached its 200 membership goal set after the St. Louis meeting a year ago. The new goal is 300 member companies by 1945. In addition to organization matters, the outstanding feature of the annual meeting was the report by Thomas H. Addie,

. . . and they cost less than 1 cent a man per week

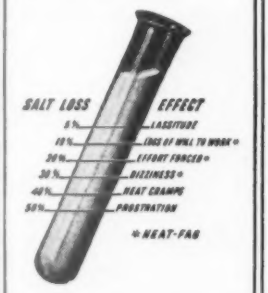
Salt is vital to proper body tone. Loss of salt through sweat can easily transform an eager, alert, comfortable worker into one who is fatigued, miserable, careless.

Loss of salt dehydrates the body, thickens the blood, destroys the equilibrium of body fluids. The results are Heat-Fag, inalertness, accidents, heat prostrations.

The preventive is salt and water—water to restore the moisture lost in sweat, salt to restore the saline balance. Water alone won't do it. Under hot, "sweaty" conditions water alone dilutes the blood and causes heat cramps.

Industrial physicians with America's greatest manufacturing plants have found that the easy, simple, economical way to provide essential salt is Morton's Salt Tablets at every drinking fountain. A tablet with every drink of water is all that's necessary to prevent Heat-Fag, heat cramps, heat prostrations — to keep workers alert, comfortable, at peak production. The cost is less than a cent a man per week.

This Is What Happens When Sweating Robs the Body of Salt . . .



QUICK DISSOLVING
(Less than 30 Seconds)

This is how a Morton's Salt Tablet looks when magnified. See how soft and porous it is inside. When swallowed with a drink of water, it dissolves in less than 30 seconds.

Case of 9000, 10-grain salt tablets - - - - - - $2.60

Salt-Dextrose tablets, case of 9000 - - - - $3.15

MORTON'S Heat-Fag SALT TABLETS

MORTON'S DISPENSERS

They deliver salt tablets, one at a time, quickly, cleanly—no waste. Sanitary, easily filled, durable.

800 Tablet size - - - $3.25

Order from your distributor or directly from this advertisement . . . Write for free folder.

MORTON SALT COMPANY, Chicago 4, Ill.

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for

THE ALLOYS YOU NEED

WHEN YOU NEED THEM!

You'll get the complete, expert service that goes with Niagara Falls' production of over 70,000,000 pounds a year . . . And you'll get it *in a hurry.*

300 ALLOYS AVAILABLE FOR SHIPMENT now!

MANGANESE COPPER, (All Grades)
SILICON COPPER, (All Grades)
PHOSPHOR COPPER, (10% or 15% Shot or Waffles)
MANGANESE BRONZE HARDENERS
ALUMINUM BRONZE HARDENERS
SILICON ALUMINUM 50/50
COPPER ALUMINUM 50/50-40/60-20/80
COPPER NICKEL 50/50
No. 25 ALLOY, (a new densifier for Brass or Bronze)
NICKEL ALUMINUM 20/80
TITANIUM ALUMINUM, 2½% & 5% Titanium
FERRO ALUMINUM 50/50, and other percentages
MANGANESE ALUMINUM 25/75, and other percentages
No. 11 ALLOY, (high conductivity)
No. 14 ALLOY, (makes castings leak proof)
No. 15 ALLOY, (a deoxidizer for Nickel Silver and Monel)
No. 26 ALLOY, (makes solid Aluminum Bronze castings)
No. 55 ALLOY, (to make perfect Red Brass castings)
ELECTROLYTIC COPPER SHOT

The "Falls Brand" laboratory is always at your disposal for whatever specific alloy information you desire.

NIAGARA FALLS SMELTING AND REFINING CORPORATION

Buffalo 17, New York

chairman of the Washington contacts committee, on the situation created by OPA price increases on bronze ingots. It was explained that a proposed amendment to the regulation covering prices of nonferrous castings has been written which, if approved will give relief to the foundries, but that this amendment is being held up temporarily. Meanwhile, nonferrous foundries cannot pass on increased ingot costs except through OPA approval of an individual appeal.

Opens New Offices At Detroit

Climax Molybdenum Co. has opened new offices at 624 Fisher building, Detroit, to handle sales and service work in Michigan, Indiana and the Toledo district. V. A. Crosby, who has been

V. A. CROSBY

associated with the company for the past 10 years as metallurgical engineer and sales representative, has been placed in charge of the office.

W. G. Patton, also stationed at this office, has charge of the compilation and publication of technical data. The company's research work continues at the Detroit laboratory of the Climax Molybdenum Co. of Michigan, under the direction of A. J. Herzig, vice president and chief metallurgist.

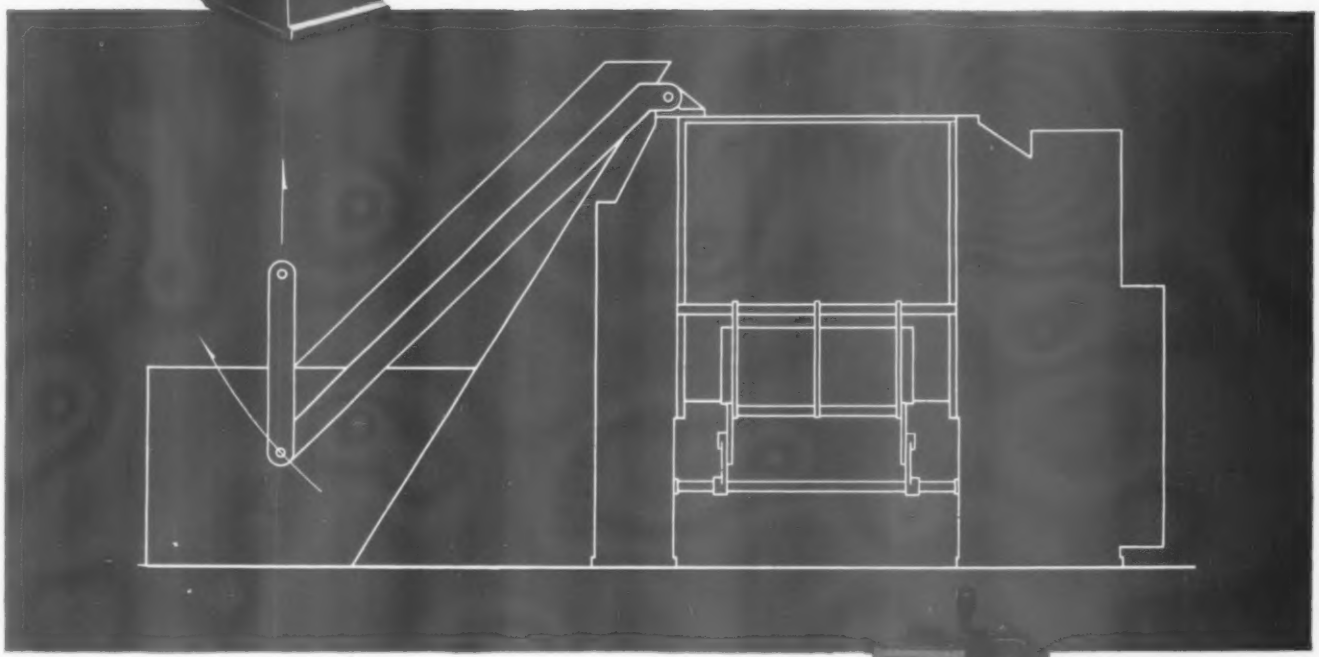
Award Clamer Medal

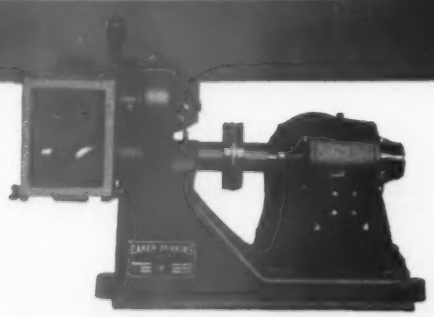
Franklin Institute, Philadelphia, has awarded the Francis J. Clamer medal to Dr. Walter E. L. Mathesius, president, Geneva Steel Co., Geneva, Utah, for meritorious achievement in the field of metallurgy, and for his contributions in the field of blast furnace practice. Dr. Mathesius was educated in Germany, and became a citizen of the United States in 1919.

Carnegie Library of Pittsburgh, Pittsburgh, recently has published two bibliographies. One by Leo Filar relates to literature on "Sintering of Ore and Blast-Furnace Flue Dust" while the other by E. H. McClelland is a "Review of Iron and Steel Literature for 1943".

UNIFORM · SPEEDY CORE SAND MIXING WITH A BAKER PERKINS "UNIDOR"

If you're interested in improving your castings and reducing spoilage by improving the character of your core sand, it will pay you to use the Baker Perkins "Unidor" Core Sand Mixer. Adaptable to or available with, an air or electrically operated skip hoist (see blueprint) Baker Perkins mixers rub, stir and knead—all in one operation. They do not require special aerating attachments. They distribute uniformly a thin layer of bond around each of the sand grains so that you get 100% benefit from the bonds, binders, oils, sea coals, pitch or other compounds that you use. And because the silica grains are not broken up, the mixed sand has a high degree of permeability. The mix is homogeneous and does not require riddling. Little or no maintenance is required other than routine lubrication and occasional replacement of steel liners and hardened steel wearing shoes. For further facts about B-P Core Sand Mixers, Laboratory Mixers, Automatic Flow Control meters, Sand Scales, Batch or Continuous Mullers for molding sand, write to Baker Perkins Inc., Chemical Machinery Division, Saginaw, Michigan.





Right: Baker Perkins 1500 to 2000 gram laboratory mixer. Any mixing done in this unit can be duplicated—on a production basis—in the large B-P Foundry Mixer shown above. The production mixers, with motor mounted at rear as an integral part of the unit, are available in 5.5, 13, or 21.5 cubic feet working capacity.

BAKER PERKINS, INC., SAGINAW, MICHIGAN

BAKER PERKINS BUILDS EFFICIENT FOUNDRY EQUIPMENT

WASHINGTON Notes

CASTINGS requirements of the machine tool industry now appear unlikely to shrink during the remainder of the year in the manner expected a short time ago. Tool demands of the armed services and other users have increased suddenly and sharply, with the result that tentative estimates of requirements for the last three quarters may be in the neighborhood of $400,000,000. Part of this will be covered by transfers of idle tools, but demand for new machines still will be relatively heavy.

★ ★ ★

With first quarter shipments of machine tools totaling $150,000,000, backlogs amounting to about the same figure, and this estimated demand for an additional $400,000,000, total production for 1944 seems likely to be well above the Jan. 1 estimate of $350,000,000. March shipments showed a slight increase over those of February, the first upturn in 13 months. Some tool builders are in a rather inflexible position to meet this new and unexpected demand because of their reduced manpower, loss of subcontractors who aided the industry in its unprecedented expansion of 1941 and 1942, and direct war work to which a portion of the industry's facilities has been converted.

★ ★ ★

LATEST issue of the Material Substitution and Supply List, issued by the WPB Conservation Division, shows no important shifts in the metals group. Malleable iron castings comprise the only ferrous item classified among materials in insufficient supply for war and essential industrial demands. Other castings, except gray iron, are listed in the group termed in sufficient supply to meet essential demands within the limits imposed by existing administrative controlling orders. Gray iron castings, in relatively better supply, are recommended as a substitute for other types wherever possible.

★ ★ ★

Inventory restrictions on malleable iron castings, imposing a 45-day supply limit, have been modified. An exception provides that a receiver now may accept up to 2000 pounds of castings of any one pattern or mold or a minimum production run, even if receipt of the shipment raises his inventory above a 45-day supply. Authority to accept the latter is contingent upon the impracticability of obtaining the smaller quantities that the customer actually needs at the time.

★ ★ ★

FIRST authorizations for production of electric flat irons have been issued, part of a program calling for total output of 2,000,000 irons this year. Initial authorizations, involving about 395,000 units, went to American Pressboard Co., New York; Bersted Mfg. Co., Fostoria, O.; Brannon Electric Appliance Co., Nashville, Tenn.; Crown Mfg. Co., St. Louis; Dejur Electric Works, New York; Dominion Electrical Mfg. Co. Inc., Mansfield, O.; New York Pressing Machine Co., New York; Steem Electric Co., St. Louis; Stern Brown Inc., Long Island City, N. Y.; Superior Products Inc., Cape Girardeau, Mo.; A. W. Waage Electric Co., New York, and Westinghouse Electric & Mfg. Co., Mansfield, O.

★ ★ ★

Farm machinery production program scheduled for this year is expected to be

(*Continued on page 226*)

WOODISON'S

6

QUALITY PRODUCTS AID CASTING PRODUCTION

★

CORE OIL

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PARTING

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CORE PASTE

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CORE WASH

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CORE COMPOUND

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SEA COAL

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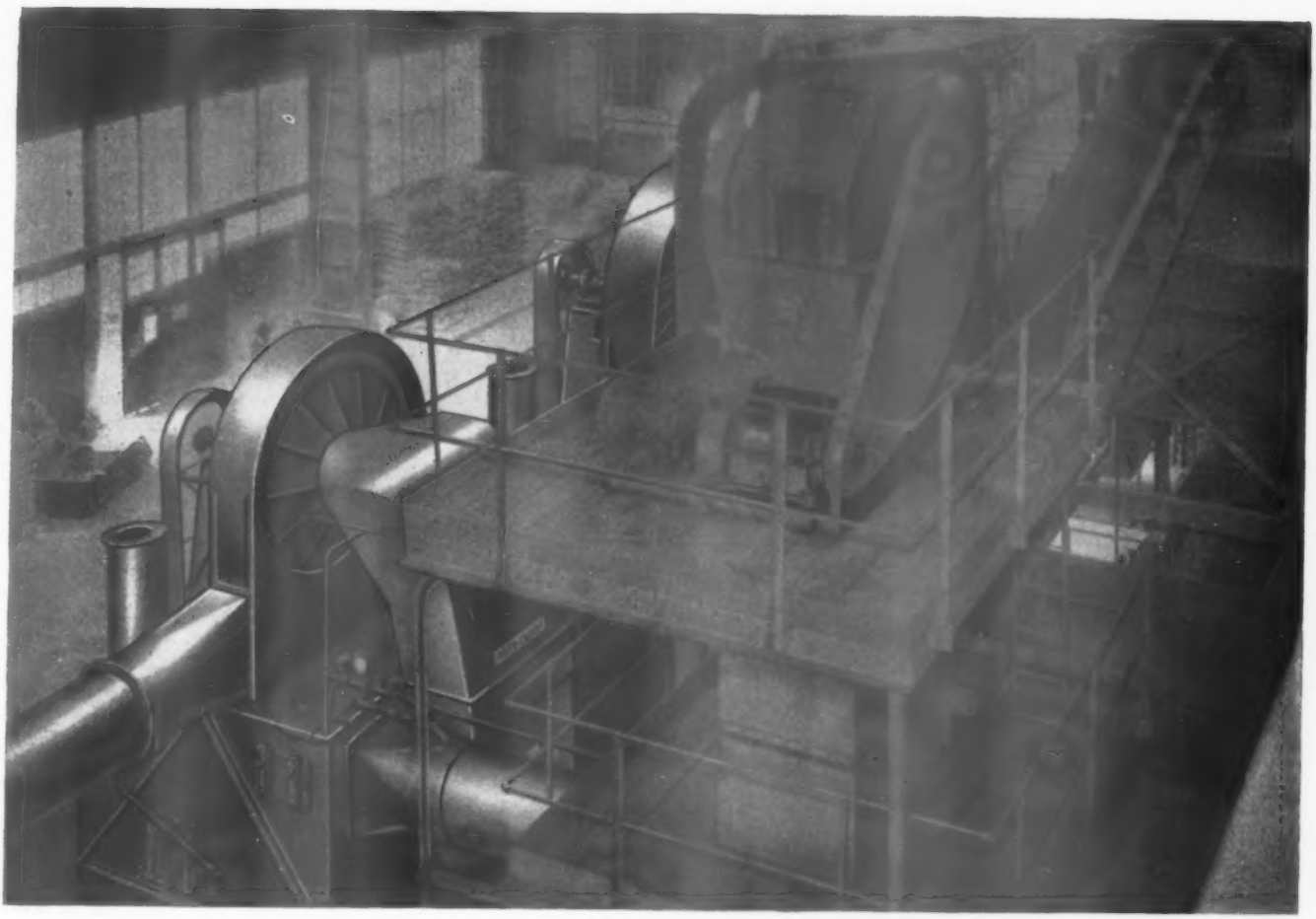


16 Type W Roto-Clones in ONE Steel Foundry!

Satisfactory experience with Roto-Clones in four other plants of this company led to the purchase of *sixteen* Type W Roto-Clones for their newest foundry. These 16 units exhaust 318,000 c. f. m. from shakeouts (124,000), sand conditioning (138,000), and sand mixers (56,000).

This installation is typical of hundreds of Roto-Clone systems in steel, gray iron, malleable and non-ferrous foundries throughout the country. Roto-Clone offers complete dust control for all foundry operations including shakeout, sand handling, screens, mullers, tumbling mills, blasts, grinders, etc. Send for descriptive literature and Bulletin No. 274A. There is no obligation.

ROTO CLONE
FOR FOUNDRY DUST CONTROL

AMERICAN AIR FILTERS

AMERICAN AIR FILTER COMPANY, INC., 266 CENTRAL AVE, LOUISVILLE, KY.
INCORPORATED
IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

(*Continued from page 224*)

realized except for certain items, notably some harvesting and haying tools. The current scheduled production period, ending June 30, will see the industry producing a total dollar volume of new machinery and repair parts substantially equal to the best prewar year's business of $624,000,000 *(wholesale) achieved in record-breaking* 1941. *The* 1945 *program is expected to be about the same as this year's, subject to what effect shortages in manpower and certain materials may have upon it.*

★ ★ ★

INGOT makers who process copper scrap or copper alloy scrap on toll, for the production of brass or bronze ingot or shot, now are required to obtain approval of their charges from OPA. Toll charges formerly were fixed at the highest level in effect during March, 1942. Requests for approval of these charges must be made by letter to the Nonferrous Metals Branch, OPA, Washington.

★ ★ ★

A ceiling price of 15 *cents a pound for a new primary grade aluminum alloy ingot, No.* 356, *has been established by OPA. This alloy is comparable with the three alloy ingots produced by blending* 50 *to* 70 *per cent scrap with high purity primary pig—alloys Nos.* 142, 355 *and* 195. *Ceiling price of the alloy is in line with maximums of the other three.*

★ ★ ★

AMOUNT of industrial productive capacity, now tied up with war work, that will be available for peacetime production when Germany is defeated is placed at 35 per cent by some WPB officials. These same men emphasize the need for adequate planning for the period before final victory, the period when partial transfer of factory capacity from war to civilian goods not only will be possible but also will be necessary to prevent widespread unemployment.

★ ★ ★

Partial reconversion of the automobile industry to building civilian cars awaits a larger reduction in military requirements than is in immediate prospect. Moreover, motor car builders would not be interested in a program calling for initial production of only several hundred thousand cars. Anything short of two million cars is regarded as both uneconomical and impracticable to produce, but the fact that the automobile industry as a whole is 75 *to* 85 *per cent converted to war work means that it will be sensitive to cuts in military needs and may be faced with some difficult unemployment problems before the day arrives when large-scale car building again is permissible.*

★ ★ ★

USE of new aluminum in manufacture of pattern no longer is limited to 600 pounds quarterly. A buyer now may place authorized controlled materials orders for any amount of aluminum patterns with his supplier merely by placing the maintenance, repair and operating supplies symbol on his order, together with the certification set forth in CMP Regulation No. 7. Foundries now will fill only authorized controlled material orders for patterns, and those that do not have aluminum and magnesium authorization numbers assigned by WPB may obtain ingot for making patterns only by indicating on their order "MRO patterns." Foundries assigned authorization numbers will continue to obtain ingots as in the past.

★ ★ ★

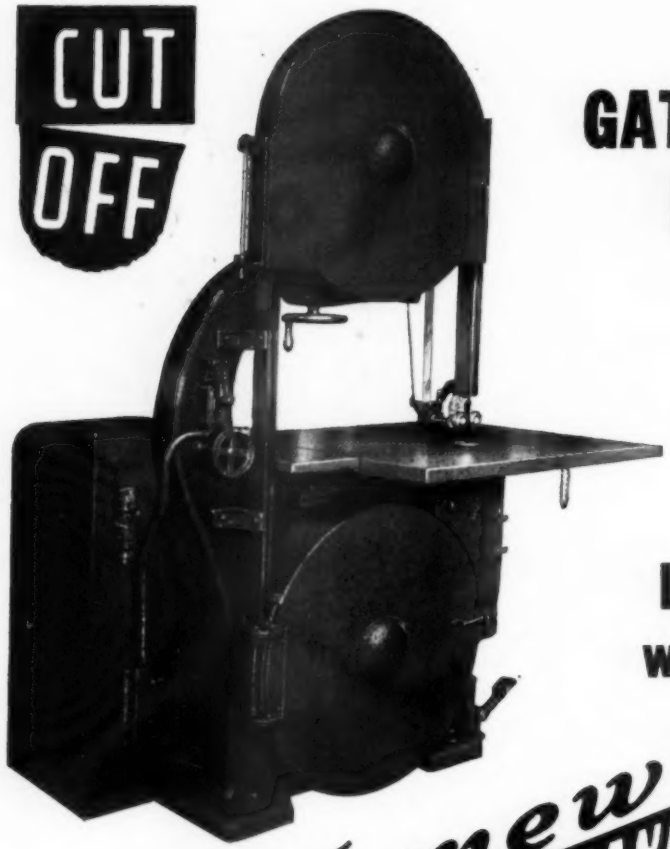
Shipments of angledozers and bulldozers, vital machines in military operations, totaled 16,110 *units last year, with monthly deliveries in the fourth quarter averaging more than* 1500. *Notwithstanding the rising trend of production, unfilled orders of manufacturers stood at* 13,010 *at the end of the year.*

★ ★ ★

COAL supply is far from comfortable. Consumers' stocks on April 1 were at a new wartime low, and while it is not unusual for supplies to shrink during the winter period of heavy consumption, there is some question whether the national pile can be built up sufficiently between now and fall to see the country through next winter without considerable trouble. Still longer hours at the mines apparently is not the answer, because it is thought that the efficiency of miners,

(*Concluded on page 228*)

CUT OFF



GATES and RISERS in any metal

in far Less Time with

Tannewitz METAL CUTTING BAND SAWS

Variable Speed

Models to fit Every Need

In addition to our regular High Speed Band Saws delivering over 2 miles of smooth vibrationless saw travel per minute, which have proved so exceedingly popular in automotive and aviation work, the TANNEWITZ line now offers five other models to provide the fastest cutting medium for every foundry need: a 30" machine available in any 3:1 speed variation from 100:300 or 1000:3000 blade feet per minute—a similar machine with 3-step V-belt drive to give 2300, 3100, 4000 blade feet per minute—a 36" machine with 32" capacity under the guide—a model with 48" wheels and one with 52" wheels, operating at 3,000 blade feet per minute for handling extra large castings. Get a line on the TANNEWITZ metal cutting band saw that fits your particular needs. It will save time, step up production and repay its cost dozens of times. Write for full particulars NOW!

THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

We'll Ship You Better Core Production IN A SAFCO DRUM!

YOU'LL GET IMPROVED CORE OIL PERFORMANCE...OR GET YOUR MONEY BACK!

Stock Cores Kept for Year Losses Minimized

In the foundry of an eastern manufacturer, a number of specialized core oils were tested for general foundry production of both gray and alloy iron castings. Tests of competitive oils (including raw linseed) indicated that SAFCO #412 Core Oil had proved its superiority on several major points.

Results showed that SAFCO #412 had reduced core losses to the point of being negligible; that cores made with #412 had sharper edges and harder surfaces. Stock cores, often kept in the stock room for over a year, retained both their strength and hardness.

Lower Cleaning Costs Improved Collapsibility

Another eastern foundry, casting bronze valves, consulted a Swan-Finch Service Engineer on methods of improving core production. The raw linseed oil they were using gave cores of sufficient strength, but had failed to meet other requirements. SAFCO RP 2-17 was suggested as being best suited to their plant conditions.

Mixed in the same sand-to-oil ratio as linseed, SAFCO RP 2-17 produced cores of equal strength at a considerable saving in core oil cost. Better collapsibility with RP 2-17 lowered cleaning costs as well, and core makers reported that cores made with this SAFCO oil worked cleaner in the core boxes.

If you have a difficult core job facing you...if you have *any* core room condition which threatens to increase your casting costs...try SAFCO Core Oils and Binders, at *our* risk! Records of actual foundry performance prove SAFCO's ability to measure up to unusual requirements—to correct faulty core oil performance—and to make good core production *better*. These records of SAFCO performance in other plants, however, merely *indicate* what it can do for you. Only a test in *your* foundry can show you *conclusive* proof of SAFCO superiority.

We invite you to test SAFCO Core Oils, therefore, on the basis of actual results in your own core room. Merely ask for a Swan-Finch Service Engineer to recommend the proper SAFCO Core Oil for your particular use. Test it—under average plant conditions—check the results for yourself. *If you don't get better all around core oil performance with SAFCO Oils, we'll cancel the invoice for your test drum!*

Swan-Finch Oil Corporation

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SCIENTIFIC LUBRICATION—MAKERS AND MARKETERS OF **SAFCO** CUTTING OILS AND COMPOUNDS
SAFCO CORE OILS • **SAFCO** MAINTENANCE LUBRICANTS • **SAFCO** LUBRICATING SPECIALTIES

(*Concluded from page 226*)

their average age up as a result of draft inroads, would slump correspondingly.

★ ★ ★

Manufacture of brewery, winery, beverage and ice cream making machinery will be resumed on a limited scale for the first time since last June. Amount of such equipment that may be built under WPB approval will be based on certain percentage of manufacturers' average annual consumption of controlled materials in 1939 through 1941. Percentages are 25 per cent for ice cream machinery and bottling line equipment, and 10 per cent for brewhouse machinery, such as beer kettles, malt mills, etc., and syrup mixing and handling equipment.

★ ★ ★

Production of a limited number of cast iron bathtubs will be continued for the remainder of the year, although sales will be restricted to government agencies, war housing, hospitals, etc. First quarter output of cast tubs was 50,000, all for war housing. No pressed steel bathtubs may be made at present because of the shortage of sheets.

★ ★ ★

LAUNDRIES probably will continue to be in a bad way from the standpoint of manpower, but WPB is offering them some relief in the way of new equipment. A program for production of $27,000,000 worth of commercial laundry equipment has been approved for the year starting April 1, with $10,000,000 worth to go to the commercial laundries and the rest to the armed services. This is only one-third of a normal year's requirements, but since the commercial laundries have been able to get very little new equipment since early 1942 the move should prove helpful.

★ ★ ★

Restrictions have been lifted on use of iron and steel in manufacture of hand trucks, platform trucks and dollies. Steel castings again may be used for wheels, and gray iron castings are permitted for certain other uses in making this equipment.

★ ★ ★

RETURN of William Kerber to private industry puts Alex Miller, chief of the Scrap Section, also in charge of the Raw Materials Branch of the Steel Division, WPB. Other section chiefs of this branch are: J. A. Claussen, pig iron; M. M. Sauers, refractories and fluxes, and Samuel Weiss, fuels. Ferroalloys, handled by a separate branch, are grouped into sections with the following chiefs: L. A. Levensaler, vanadium and molybdenum; Otto D. Rohlfs, tungsten and cobalt; Olaf N. Rove, manganese, chrome, rutile, zircon and columbium ores; Thomas C. Ford, manganese, chrome, silicon, ferrocolumbium metals and alloys; George A. Silver Jr., nickel.

★ ★ ★

In the Forging and Castings Branch, George F. Hocker remains as chief with T. H. Parke deputy chief. The various castings sections are headed by the following; C. E. Grigsby, steel; R. E. Valentine, malleable; A. D. Hannah, gray iron.

W.G.G.

SCRAP PAPER: **At least 75 per cent of all paper that previously was discarded must be saved for reconversion if a critical shortage is to be averted, according to the War Department. It points out that in 1943 the Quartermaster Corps took nearly 600,000 tons of paper, and that 1944 needs, particularly for packaging material, are expected to be greater, in view of the growing number of troops to be supplied overseas. Used paper idle in file cabinets, record vaults, storage rooms, book cases and desks is vitally needed now. Industry is urged to round up its old catalogs, price lists, time cards, invoices, vouchers, bulletins, posters, pamphlets, correspondence, cancelled checks, etc., and dispose of them for salvage.**

IF IT'S Snagging Speed
HERE ARE Your Wheels
For fast snagging and downright tough grinding there are no better wheels on the market than the Dayton line of snaggers. Built to the exact size, shape, grade and grain required. Widely used in steel and gray iron foundries all over the country. Try Daytons and you'll want to standardize on Daytons. Write, wire or phone your requirements, or consult a SWW engineer.
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710 Negley Place
Dayton, Ohio

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FOUNDRY SUPPLIES "Everything"

FINISH 'IT' IN 1944!

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- SEA COAL FACING
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- AKRO COMPOUND
- PARTEX (Walnut Shell Parting)
- BENTONITE
- PENCO CEREAL BINDER
- STEEL SHOT—All Sizes
- STEEL GRIT—All Sizes
- LADLE BOWLS, SHANKS
- KORITE CORE PASTE
- SHOVELS, RIDDLES
- SKIM GATES, BRUSHES
- PURITE
- PATTERN SHOP SUPPLIES
- SILVER LEAD FACING
- CORE BLACKING
- PLASTIC IRON
- NO-VEIN COMPOUND
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Open Hearth Meeting Heavily Attended

Twenty-seventh annual Open Hearth, Blast Furnace and Raw Materials Conference, held April 20-21 at William Penn Hotel, Pittsburgh, broke all attendance records with approximately 1100 present. Arranged by committees of the American Institute of Mining and Metallurgical Engineers a wide range of topics pertaining to acid and basic open hearth problems were discussed, and they primarily were concerned with large furnaces used in production of steel ingot. Subjects discussed included quality of acid open-hearth steel, combustion in open-hearth furnaces and metallurgy of the open-hearth process.

At the annual dinner April 20, Henry A. Roemer, Sharon Steel Corp. presided and J. L. Perry, Carnegie-Illinois Steel Corp. was the principal speaker. McCune award of the conference was made to J. W. Hailey and G. M. Plimpton Jr., Inland Steel Co., Indiana Harbor, Ind., for their paper on "Segregation of Rimming Steel", and second place winners were W. O. Philbrook and J. H. Jolly, Wisconsin Steel Division, International Harvester Co., for their paper on "Survey on Slag Control Methods".

In a discussion of quality of acid open-hearth steel held Thursday morning H. F. Allison, United Engineering & Foundry Co., Pittsburgh, reviewed British data on gases in steel and pointed out that they mainly were concerned with solubility of hydrogen, and formation of hairline cracks. Indications were that hydrogen in steel forms methane which breaks down, resulting in high pressures which cause hairline cracks.

S. W. Poole presented a paper prepared by E. R. Johnson, Republic Steel Corp., Canton, O., which described a slow annealing process which prevents flaking in rolled steel by elimination of hydrogen and residual stresses. Carl A. Zapffe, Battelle Memorial Institute, Columbus, O., in the discussion pointed out that cracking and similar phenomena are not due to hydrogen alone but to a combination of hydrogen and some superimposed thermal stress. Hydrogen by itself only results in lower elongation and yield strength. Mr. Christofer, Continental Foundry & Machine Co., stated that steel castings are not troubled with hairline cracking even with large grain size, and attributed that freedom from cracking to slow cooling in sand molds. C. E. Sims, Battelle Memorial Institute, mentioned that shatter cracks in steel often result from rapid cooling which causes the outside of the piece to be in compression while the center is in tension. That condition results in a zone where stresses are at the maximum, and much weaker than the rest of the piece.

Slag Conditions Important

Thursday afternoon was devoted to a discussion of the metallurgy of the open-hearth process which dealt with slag-bath relations, hydrogen and nitrogen, control of grain size, and hardenability intensifiers. As to slag-bath relations it was pointed out that although considerable study has been made on the subject little control actually is possible on conditions. That is due to the numerous variables in furnace practice. For example, finely divided colloidal particles in the bath and amount of boil have an important effect. Then when the metal is tapped there is considerable disturbance of conditions, due to the steel flowing through the small taphole opening.

Manganese distribution in the molten bath depends on such factors as amount in the furnace, oxidation level, temperature, slag basicity, slag viscosity, bath condition, time of addition, etc. To obtain a high residual manganese it is necessary to have a high ratio of manganese to silicon in the hot metal added to the furnace. Slag which has a high basicity will cause lower residual manganese. Elimination of chromium from the molten bath can be obtained by low temperature, since with high temperatures the chromium goes from the slag into the metal. High iron oxide in slag aids in elimination of chromium. Slag with a lime to silica ratio of 2.4 will take out 90 per cent of the chromium.

In acid open-hearth practice the slag is the source of oxygen for the bath, and

(*Concluded on page* 232)

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(*Concluded from page* 230)

the important function of that element is to control the activity of the slag. If too little iron oxide is present oxygen is absorbed from the air, while if too much, silica is absorbed from the hearth walls.

Methods of determining hydrogen and nitrogen in steel were discussed, and it was stated that the vacuum fusion and direct combustion methods gave good results. The hot extraction method for hydrogen is simpler, and practical for comparative information, since presumably not all of the hydrogen is determined due to the long time required for attaining the proper time-temperature relationship. In the hot extraction method a solid sample is used. With increase in carbon content a longer time for anlysis is required as is the case with aluminum-killed steel.

In steelmaking a rapid boil and reduction of carbon content decreases the nitrogen content of the bath. Since all materials added to the bath contain hydrogen, it is difficult to control absorption or solution of hydrogen.

Pressure for increased production appears to have resulted in a decrease in furnace life, but there seems to be a difference of opinion on whether that is due to type of refractories or to a shortage of manpower to do repair and construction work properly. In some cases a considerable saving in cost of furnace repair and rebuilding was obtained through use of mechanical aids such as tractors, bulldozers and loaders. Use of vacuum cleaning equipment for furnace cleanout resulted in use of only 80 man-hours as compared to 600 with conventional methods.

Discussion of fluorspar substitutes indicated that little success was obtained with some. Salt in various forms, such as cattle salt, tended to vaporize and coat the furnace on the outgoing end. Recommended practice was to use 75 per cent fluorspar and 25 per cent salt. Aluminum dross used early in the heat works satisfactorily, but shows no advantage over fluorspar. Ilmenite is hard to handle, and more is required. Fluorspar concentrates have advantages over ordinary spar, but due to its finely divided condition is hard to handle. However, the concentrates are being briquetted which should help considerably.

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Don't gamble; get the facts from the men who run 'em! A list will be sent you and there's no obligation. Write-

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Centrifugal Castings Conference Subject

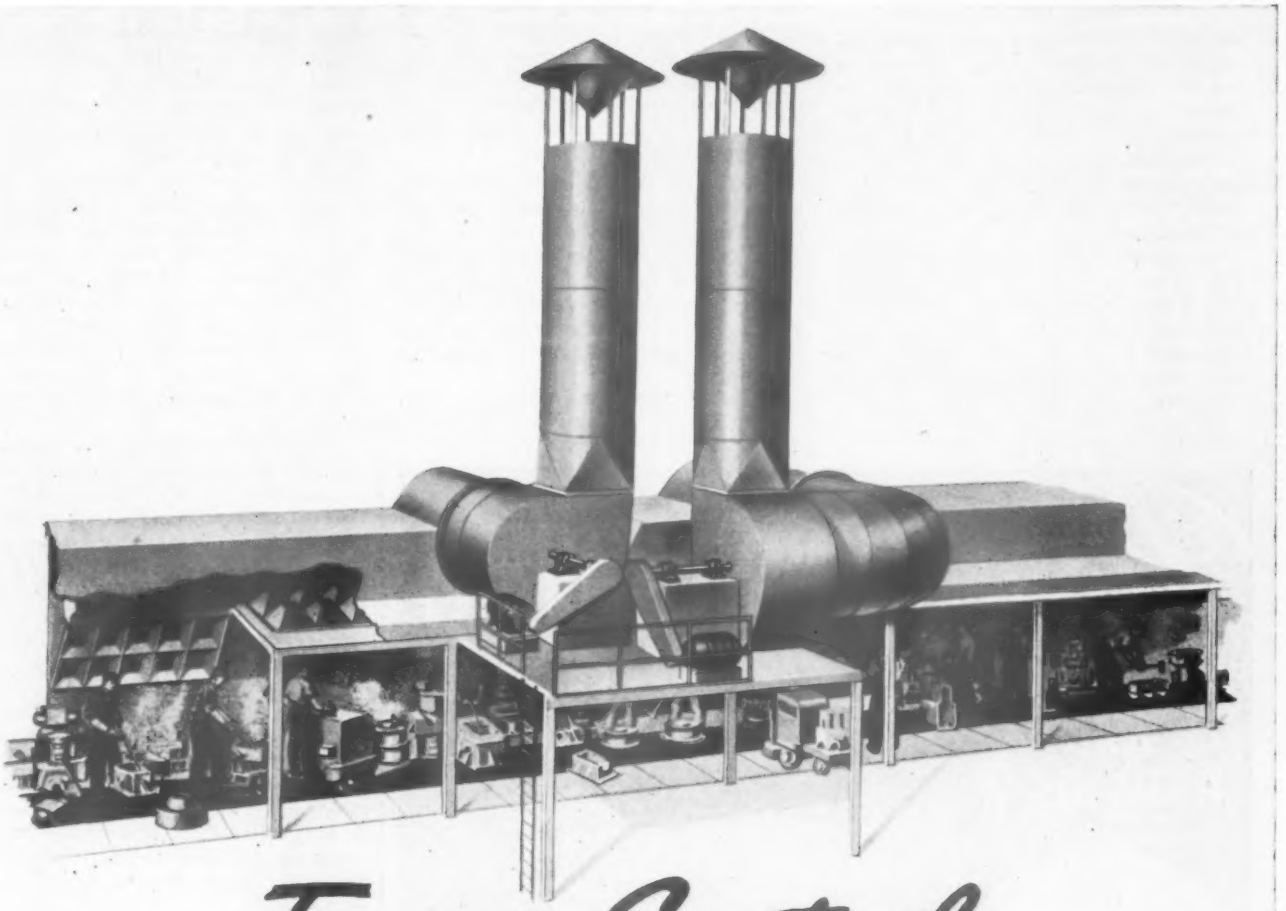
Two panel sessions devoted to foundry subjects were included in the Chicago War Production Conference held at the Hotel Stevens, Chicago, March 30, under the sponsorship of the Chicago Technical Societies Council. This was one of a number of such conferences conducted in various industrial centers at the request of the War Production Board. The Chicago gathering attracted an overflow attendance of more than 3500 persons, with more than 125 participating in the foundry sessions. The latter were sponsored by the Chicago Chapter of the American Foundrymen's Association.

Dr. R. F. Thomson, foundry metallurgist, Dodge Chicago Plant, was general chairman of the foundry panels, the first of which consisted of a discussion on the production of centrifugal castings. Speaking on the metallurgical aspects of centrifugal castings, Walter Edens, Ampco Metal Inc., Milwaukee, pointed out that changes in chemical composition of the metal are not necessary in going from the static to the centrifugal casting process, also that the latter does not necessarily result in denser castings but does promote greater uniformity throughout the various sections. He added that choice of mold material will have considerable to do with casting quality.

Production methods and applications of centrifugal castings were discussed by John Putchinski, Allis-Chalmers Mfg. Co., Milwaukee, in a paper in which he outlined various advantages of the centrifugally cast product and limitations on use of the process in making castings of certain types and sizes. For gray iron castings such items as gear blanks, sleeves and bushings are best adapted to centrifugal castings. In the case of nonferrous metals the process has been used to produce castings capable of withstanding high internal pressure.

For castings adapted to production by

(*Concluded on page* 234)



Fume Control
for aluminum and magnesium foundries

● The fumes and smoke resulting from knocking cores out of aluminum and magnesium castings can be collected and positively removed from the building with Bartlett-Snow Fume Control equipment. As illustrated in the cutaway view above, these systems consist of groups of Bartlett-Snow's highly efficient pyramidal shaped collecting orifices (U. S. Pat. 121,704, July 30, 1940) mounted along the backwall and in a canopy which extends out beyond the knockout grating.

Castings to be knocked out are dumped on the grating from an industrial truck. The broken cores are dropped through the grating to a collecting hopper. The fumes and smoke, steam and dust are drawn off through the orifices. The men work in a clean cool air stream—seldom come into contact with even faint traces of smoke or fumes,—and have practically no restriction in their work.

Our recently completed 40-page Foundry Bulletin No. 91 illustrates many different types and applications of Bartlett-Snow Foundry Equipment,—and contains much information of interest to every foundryman. Send for a copy today!

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(*Concluded from page* 232)

either the centrifugal or static process Mr. Putchinski cited the following advantages for the former: Equal or lower cost, improved quality, better yield, and maximum production in limited space. In some cases centrifugal castings also have an advantage over forgings, the latter requiring more expensive equipment and labor in their production.

In a general review of centrifugal casting theory and practice H. F. Taylor, Naval Research Laboratory, Washington, emphasized that in the case of steel castings each job must be engineered, since it is not always true that the same casting made centrifugally is a better product than one cast statically. However, the centrifugal process does have the advantage of providing better directional solidification, it enables thin wall sections to be filled more easily, makes possible the pouring of colder metal, and provides a saving in cores.

Mr. Taylor showed slides illustrating various types of centrifuging machines and examples of some large castings being made by the process. Speaking of the precision casting method for making small parts to accurate dimensions, he predicted that sizable castings some day will be produced in this manner to tolerances of 0.001-inch.

Second session of the Chicago conference was devoted largely to casting application. It was opened by a talk by Maj. S. C. Massari, head of the production section, Chicago Ordnance District, who described the various specifications established by the Ordnance Department applying to different types of castings. In discussing inspection of castings Major Massari explained that while defective castings naturally cannot be accepted, certain defects can be tolerated depending on their nature and location and application of the casting—in other words, it is realized that few castings are absolutely perfect, and some defects detract nothing from the usefulness of the product as long as they are not in sections subject to stresses.

Adaptability of castings of various compositions was discussed by several speakers, including Duncan P. Forbes, Gunite Foundries Corp., Rockford, Ill. on ferrous metals; T. D. Stay, Aluminum Co. of America, on light metals, and Chester K. Faunt, Christensen & Olsen Foundry Co., on brass and bronze. Mr. Forbes listed various factors that must be considered in the selection of a material by the engineer. Among these he included strength, ductility, cost, wear resistance, weldability, pressure tightness, appearance, corrosion, resistance, and machinability. He recommended that foundrymen participate in the design of parts to be made from castings, pointing out that many rejected castings result from faulty design for which the foundry is not responsible.

Reconversion to normal production will entail many changes.

In foundries it may require the repair of overworked ovens—the redesign of outdated equipment—the rearrangement of core and mold ovens—or their removal to new locations.

If such needs develop and your equipment was built by Lanly you'll doubly appreciate the Lanly sectional construction of housings—the flexibility of the heating unit as to application—the durability of parts, equipment and controls.

Lanly is in a position to render expert assistance in any service pertaining to ovens or furnaces for industrial uses. Write for illustrated catalogs and consult us regarding any need that may arise.

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A.S.T.M. Will Meet In New York

Forty-seventh annual meeting of the American Society for Testing Materials will be held at the Waldorf-Astoria hotel, New York, on June 26 to 30. Tentative plans include a roundtable discussion on centrifugal castings, including such phases as methods of evaluating properties, selection of test specimens, and other problems. In addition, separate technical papers will be presented on a wide variety of subjects in the metals field such as steels and precipitation-hardened alloys at low temperatures; yielding phenomena of metals (influence of speed and loading conditions); short-time tests of soldered joints; characteristics of the Tuckerman strain gage; methods for determining hardness conversions for materials softer than 240 brinell; an alternate immersion test for some aluminum-copper alloys, and routine metallographic examination of commercial magnesium alloys.

Selas Changes Name

The Selas Co., Philadelphia, consulting and manufacturing gas engineers, has changed its corporate name to Selas Corp. of America. The action was necessitated by recent expansions, and by ramifications of the company's domestic and export activities, but involves no change in organization, service or personnel.

A Buffalo TOPIC

Making the castings for winning the war, theme topic of the great War Production Congress of the A.F.A., naturally emphasized the subject of good iron, structurally right and trouble free. Such iron as is produced with GLOBE SILVERY, rich in the indispensable constituent, silicon, but in desirable quantity to maintain the correctly balanced, near ideal, melt.

GLOBE IRON CO. originated high silicon iron production in America and was the first organization to call to the melters' attention the benefits to be derived. This leadership has never been relinquished and today GLOBE SILVERY IRON sets the pace.

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THE PIONEERS OF SILVERY IRON
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Gives Suggestions on Compressor Care

By BRUNO THIEL
Cooper-Bessemer Corp.
Mount Vernon, O.

IN VIEW of today's shortages in replacement parts, and with war-time requirements demanding that compressors be kept at peak operating capacity even when subjected to long periods of uninterrupted service, it is important that plant maintenance engineers follow certain fundamentals that apply to the care and maintenance of compressor units.

The following suggestions are summarized for the purpose of assuring the most efficient performance of large compressors regardless of the type of service they are rendering.

Lubrication: Minimum wear of moving parts can be assured by using the proper grade of lubricating oil. Too much oil, even of the best grade eventually will gum up piston rings and cause them to stick in the grooves, thus reducing the capacity of the compressor due to piston ring leakage. Excessive wear on the cylinder walls may also result because the wire-drawing of the gases between the piston and cylinder wall will blow off the lubricating film and permit a metal-to-metal contact. The excessive oil will also collect on the discharge valves and will carbonize on the hot seats, permitting the valves to leak. Insufficient lubrication naturally will cause wear on piston rings, piston and compressor cylinder.

While there are no hard and set rules governing the lubrication of compressor cylinders, each operator should set up his own standard to apply to individual requirements, the basis of which depends upon the gas that is being compressed and the nature of the oil being used. For example, when gases containing gasoline vapor or a large percentage of the hydro-carbons are being compressed, a lubricant that is insoluble in the gas should be used. Such lubricant may be a soap solution, castor oil, or a blend of castor and petroleum oil.

It is good practice to remove a cylinder head occasionally to check the condition of the cylinder wall and make sure the cylinder is receiving the proper amount of lubrication.

Valves: All compressor valves, whether plate or poppet type, should be overhauled thoroughly so that the valves will close tightly when installed in the cylinder body. A leaking valve soon heats the valve and its surrounding area to a temperature considerably higher than the operating temperature for which the unit was designed. Excessive heat thus generated will warp the plates of the plate valves, resulting in even greater leakage or, in case of a poppet type valve, will cut and destroy the valve seat and face.

Piston Rings: Rings should be free in the ring grooves but should not have excessive play. Each ring should be fitted individually to the compressor cylinder bore so that expansion of the ring under normal heat will not butt the ends together and force the ring out against the cylinder wall to cause undue wear.

Cooling Water: Compressor cylinder jackets should be kept clean and free from scale. The water used to cool compressor cylinders should be of a composition that will prevent excessive scaling in the jackets at the normal operating temperature of the compressor. All foreign matter such as mud, grit and similar substances should be removed from the water before it is circulated through the compressor cylinder jackets. The amount of water, however, should be so regulated that the cylinder jacket and liner are not cooled to an abnormally low temperature as this condition will decrease the clearance between the hot compressor piston and the cylinder wall, thus inducing a sticky piston. A temperature differential of about 20 degrees Fahr. should be maintained between the incoming and outgoing water. If the incoming water is too cold it should be corrected by bringing the temperature to at least 70 degrees Fahr.

Loading: Under today's conditions, when restrictions hold up delivery of re-

(*Concluded on page* 238)

Milwaukee Chills have passed the rigid inspection of foundrymen who demand the best. These Chills have been improved to accelerate cooling, insuring sound castings free from internal shrinks and surface checks. They will also prevent molten metal from cutting into the sand. These Chills will cut scrap losses, and reduce welding and cleaning costs.

Ask for samples and prices on Milwaukee Thread Stem Chaplets . . . . Standard Radius Chills . . . . Schmitz Chaplets . . . . Patented Adjustable Radius Chills . . . . Other Chaplets and Foundry Supplies.

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- ★ PATTERN LUMBER
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(*Concluded from page* 236)

placement parts or make them unobtainable in some instances, cylinders occasionally may have to be used for pressures exceeding those for which they were designed. In such cases, extreme care should be exercised to keep the working pressure at or below that stipulated by the manufacturer of the cylinder. If the cylinder is to be used for pressures other than those for which it was intended, it is good policy to consult the manufacturer for his opinion based on the changed operation conditions. Such practice will avoid damage to either the compressor or the mechanism which drives it.

Compression Ratios: Compression ratios should be kept as low as possible to prevent overheating compressor cylinders. While overheating may not always damage the compressor cylinder, it might result in a temperature higher than the flash point of the lubricating oil, in which case fires or explosions may occur, particularly in compressors operating on air.

Overheated conditions also lead to excessive carbon deposits in piston ring grooves and valves. A high ratio of compression in a compressor built for a low compression ratio, may also overload the piston rod and running gear.

Cleanliness: As with any fine piece of machinery, the compressor should not only be kept clean but the operator should take steps to be sure the gas being compressed is as clean as practicable. Gases containing dust or other abrasives will soon wear the compressor piston rods, rings, and cylinder walls to such an extent that the compressor will require reboring and complete overhauling long before the normal time set for such operations.

Corrosion: If the gas to be compressed contains any of the corrosive gases such as hydrogen sulfide, the manufacturer should be consulted for his opinion as to whether the compressor can be operated satisfactorily for such service. Many times a few minor changes will render a standard compressor suitable for compressing highly corrosive types of gases.

Careful attention to the foregoing simple but important details will help greatly to assure peak operating capacity of compressor installations with a minimum of maintenance time and cost.

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are repeat orders

Transite Core Plate Users come back for more!

HERE'S why Johns-Manville Core Plate changes one-time buyers into long-time customers:

Light Weight: Transite Core Plates light weight means easier handling, increased production.

Less Breakage: Their fibrous nature provides unusual shock resistance, minimizes breaking and cracking.

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Economical: These J-M plates combine low initial price, low handling costs and long life.

Low Warpage: Maximum warpage on plates under 24" is 1/64" on either dimension. On plates over 24", warpage will not exceed 1/64" in 24" length and width.

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Johns-Manville
TRANSITE Core Plates

OBITUARY

THOMAS I. CURTIN, 63, president and treasurer of the Waltham Foundry Co., Waltham, Mass., until ill health forced his retirement early this year, died May 7 at his home in that city. A native of Waltham, Mr. Curtin was educated in the local schools, and was active in civic affairs there. He was a member and past director of the New England Foundrymen's Association.

° ° °

William H. Waltz, assistant superintendent of foundries and pattern shop, General Electric Co., Schenectady, N. Y., died recently. Mr. Waltz was graduated from Lehigh University, Bethlehem, Pa., in 1922. Following graduation he became connected with the steel foundry of the Bethlehem Steel Co., becoming assistant superintendent in 1928. In 1930 he was appointed steel casting contact engineer. In 1931 he became superintendent of the Crucible Steel Castings Co., Cleveland, and later was assistant superintendent of the steel foundry, Newport News Shipbuilding and Drydock Co., Newport News, Va.

° ° °

William H. Krukemeyer, 45, office manager and purchasing agent of the Atlas Foundry Co., Cleveland, and associated with that company more than 28 years, died April 29. Born in Cleveland, he started working for the Atlas Foundry Co. as a shipping clerk. Later he became office manager and purchasing agent.

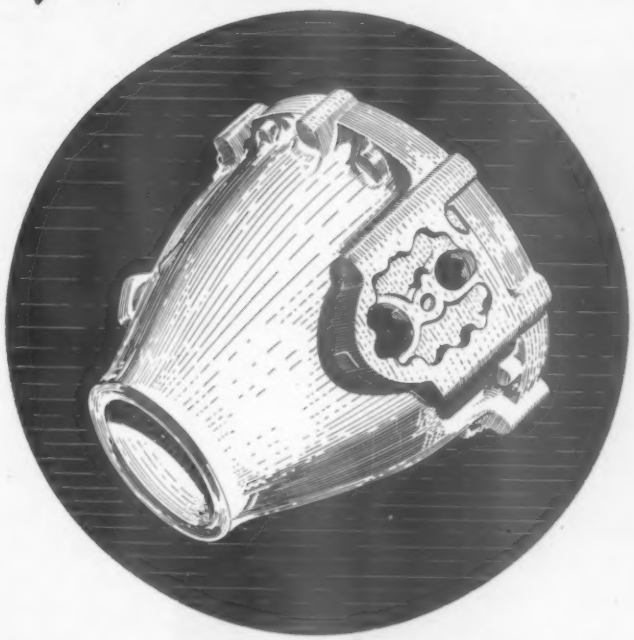
° ° °

Alfred E. Domville, 81, formerly general superintendent of Griffin Wheel Co., Chicago, died there April 14. He began his industrial career with the Griffin Wheel Co. in the early eighties, and supervised the building of car wheel foundries for different companies in the United States and Canada before intro-

(*Concluded on page* 240)

AQUA-SET

A synthetic binder



Larger castings that are heavily cored may require considerable strength in the core itself for safe handling, and for this type of core as well as for smaller ones we recommend AQUA-SET as the core binder. Baking is fast in a low oven, and the shake-out is complete and clean. The casting shown above is one of the heavier types in magnesium. The core assembly was a particularly large one, and AQUA-SET No. 900, used as the bonding agent, not only built up a strong core but produced a smoother texture at the surface of the casting similar in appearance to the dense, smooth surface of the core itself. This new synthetic binder will produce smoother, better castings for you and reduce cleaning costs. Write us for particulars.

UNITED

United OIL MFG. CO.

1429 WALNUT ST. ERIE, PA.

(*Concluded from page 238*)

ducing the Griffin process in several European countries. Following his return from Europe he was connected with the American Car & Foundry Co., in Berwick, Pa., and Detroit. Later in Detroit he started and operated one of the first mechanized foundries and with Hugh Martin started the Detroit Gray Iron Foundry Co. He returned to the Griffin Wheel Co. in 1917, and in 1922 was appointed general superintendent of the entire group of 12 foundries operated by that company in the United States. He retired July 1, 1939, from active service but was retained as a consultant. During his long career as a chilled car wheel maker he assisted in the development of many mechanical methods and in improvements in cupola melting practice.

° ° °

Andrew Harley, in charge of foundry operations for the Daimler Co. Ltd., Coventry, England, died April 16 in that city. President of the Institute of British Foundrymen in 1931, Mr. Harley was president of the International Committee of Foundry Technical Associations in 1932, and will be remembered by those American foundrymen who attended the International Congress that year in Paris. Before joining the Daimler Co. Mr. Harley had been associated with the Carron Co. and the Coalbrookdale Co.

° ° °

David J. Carson, 75, retired owner and president of the former Carson Foundry & Mfg. Co., Tecumseh, Mich., died April 16 in Grand Rapids, Mich. Mr. Carson at one time was manager of the American Malleables Co., Lancaster, N. Y. In 1915 he became president and general manager of the Acme Steel & Malleable Iron Works, Buffalo, disposing of his interests in 1925. Mr. Carson became president and treasurer of the Tecumseh company late in 1934.

° ° °

J. Byron Henry, well known throughout the steel castings industry, died April 13 in Wheeling, W. Va. Mr. Henry began his career with the Union Steel Casting Co. in 1911, rising to the position of vice president and general superintendent. He left that company in 1930 to join Standard Steel Works at Burnham, Pa., and in 1933 joined Continental Roll & Steel Foundry Co. and up to the time of his death was identified with that company's Wheeling plant.

° ° °

Eugene H. Baum, 43, vice president and general manager, Montague Castings Co., Muskegon, Mich., died May 11 in that city following an operation. Prior to affiliating with that company about a year ago, he had been associated for many years with Michigan Foundry Supply Co.

° ° °

Richard Nicholas, 67, retired vice president of Hickman, Williams & Co. Inc., died May 4 at his home in La Jolla, Calif. He had been with the company for 20 years until ill health forced his retirement 16 years ago.

° ° °

Charles L. Taylor, 68, president and treasurer of the Taylor & Fenn Co., Hartford, Conn., and president of the Collins Co., Collins, Conn., died March 30. He had been active for many years in affairs of the Gray Iron Founders' Society.

° ° °

Frank W. Quillin, 69, supervisional manager of the National Malleable & Steel Castings Co., and an employe of the company for the past 40 years died in Cleveland, April 28.

° ° °

Paul F. Halverson, 67, president and one of the founders of the Beloit Foundry Co., Beloit, Wis., died April 13.

° ° °

Oscar J. Bedford, 48, superintendent of Scott & Williams, West Concord, Mass., died recently. Mr. Bedford was an active member of the New England and American Foundrymen's Associations.

° ° °

Earl W. Roberts, 62, president of the Roberts Brass Mfg. Co., Detroit, died May 7 in that city.

February production of steel castings by companies reporting to the Department of Commerce was 161,359 tons, compared with 159,795 in January and 151,530 in February, 1943.

(*Photo courtesy of Maumee Pattern & Mfg. Co., Toledo, O.*)

HOW TO MAKE SMOOTH-AS-GLASS PLASTER PATTERNS

THE secret to making even large plaster cores like this is to use Gold Bond Pattern Plaster. The setting time is always uniform. It's easy to handle. And you get a surface on the plaster pattern that's as smooth as glass!

Gold Bond Pattern Plaster is warehoused and sold by Frederic B. Stevens, Inc., Detroit; Toledo Plaster & Supply Co., Toledo; Wm. Lynn Chemical Co., Indianapolis; Ed Schory & Sons, Canton; Hill & Griffith, Cincinnati; Cleveland Builders Supply Co., Cleveland. It may also be obtained from National Gypsum plants at Medicine Lodge, Kansas and New York, N. Y.

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FOUNDRY PRODUCTS

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Major
PRODUCTION
Operations
DEMAND THE BEST
And "the best" in Chaplets, Chills and Superchills (patented) has long been identified with the fine old name of Fanner.
Today, more than ever, when there can be no compromise with either time or quality in turning out the best possible castings in the shortest possible time, the need for these vital Fanner products is a very essential "must" in every successful production speed-up.
Our engineering experience is "at your service" in helping you take full advantage of speeding up your casting program with Fanner Chills, Chaplets and patented Superchills. Call on us.
PRODUCE for VICTORY but PLAN for PEACE

THE FANNER MANUFACTURING CO.

Brookside Park, Cleveland, Ohio • The Canadian Fanner, Ltd., Hamilton, Ontario

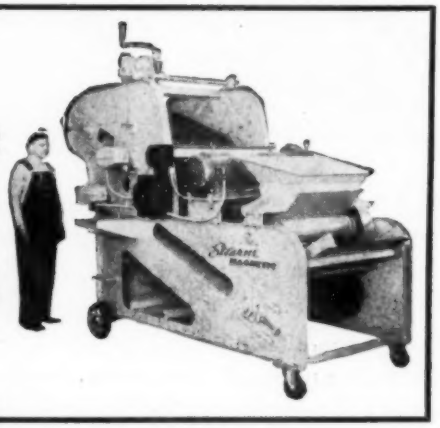
Cleveland Pneumatic Has Anniversary

Cleveland Pneumatic Tool Co., Cleveland, is marking its 50th anniversary this month. Incorporated in Ohio on May 29, 1894, as the Union Electric Co. for the purpose of making and selling electric appliances, the company originally had ten employes and occupied about 3000 square feet of floor space. The present name was adopted in 1899 and facilities were concentrated on the development of pneumatic appliances. In that year the company's first pneumatic riveter and pneumatic chipper were developed, manufactured and marketed.

During its early days, the company's policies were formulated by Claus Greve, its president. He was succeeded as chief executive officer by his son, the late L. W. Greve, who died in 1942, a pioneer in the development of the aviation industry. The Cleveland company made the first air-oil shock strut and currently operates the world's largest factory devoted solely to straight-line production of aircraft landing gear.

Meehanite Research Institute of America, New Rochelle, N. Y., has published a bulletin, "Meehanite—the Metal for Post-War Castings," describing recent applications for highly stressed parts.

Stearns MAGNETIC PULLEY SEPARATORS pay for THEMSELVES



"Does in SIX HOURS what formerly took 3 DAYS..."
"Replaces FIVE old separators..."

These are facts from actual users that prove Stearns Magnetic Separators definitely profitable investments. . . . Conservation of metal is a "must" these days but to do it economically, automatically, smoothly on such jobs as reclaiming brass, aluminum and other secondary metals from borings, chips and metal refuse requires well designed and well built Stearns Magnetic separating equipment.

If you are interested in increasing the value of your scrap metal write for this Bulletin 302. No obligation. Investigate Stearns Magnetic methods.

STEARNS MAGNETIC MANUFACTURING CO.
662 S. 28th St., Milwaukee, Wis.
SEPARATORS DRUMS ROLLS CLUTCHES BRAKES SPECIAL MAGNETS

Iron Foundries Need 21,865 Workers

Gray iron foundries need a minimum of 21,865 additional workers to keep abreast of their war assignments, according to a survey conducted by the Gray Iron Founders' Society. A total of 1954 gray iron foundries, approximately 80 per cent of the industry, replied to the society's questionnaire, but the 21,031 men and 834 women needed are the urgent requirement of less than 1100 plants. Slightly more than 600 foundries indicated their present forces are adequate to maintain present schedules. At least 10 per cent of the prewar industry is inoperative, largely for reasons traceable to the war.

Industry employment has dropped 22,900 from normal through losses to the armed services and quits for other jobs, despite a 116 per cent increase in number of women workers. Jobs are vacant in practically all classifications, the most critical needs being for molders, coremakers, grinders and chippers, semi-skilled and unskilled workers.

City Pattern Tops Detroit Bowlers

Pattern Maker's Bowling League of the Detroit Metropolitan District, sponsored by the Pattern Maker's League of North America, held a tournament April 16 at which City Pattern Foundry & Machine Co.'s Team No. 19, representing the wood pattern shop, won the championship trophy for the season.

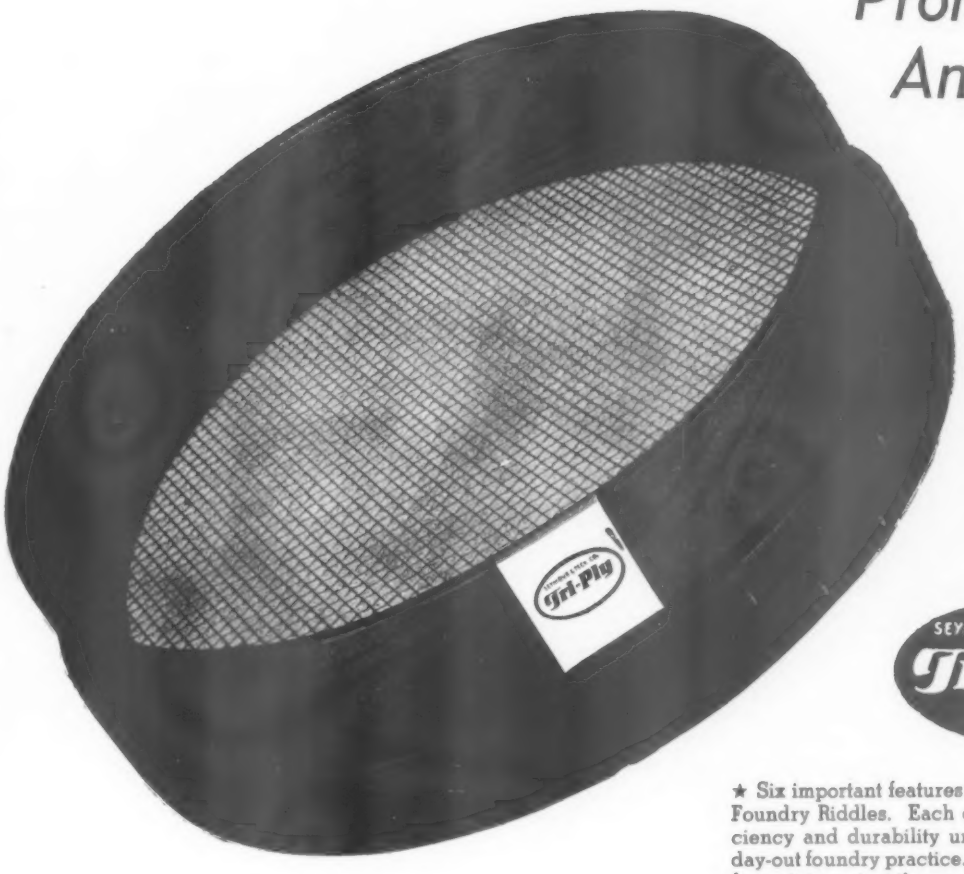
Twenty-six teams represented pattern shops throughout the district and City Pattern sponsored three teams, No. 1 and No. 7 representing the Metal Department and No. 19 the Wood Department. Al Brusinski, No. 3 man on the winning team was second in individual game scores with 252 and third with 249. Adolph Mierzwa was fifth in the 3-game totals with 616 points and the team won 86 out of a possible 120 games for the series. The players were as follows: Adolph Mierzwa, Jay Law, Al. Brusinski, Joe Taleck and Ferd Wunsche.

Plan for Employing Veterans Set Up

Brown Instrument Co., Philadelphia, has initiated a plan for employing discharged war veterans whereby each of the draft boards within a 35-mile radius of the company's plant is provided weekly with a list of jobs open and type of men and experience required. In addition, the company offers qualified veterans an opportunity to receive instruction at the Brown school in preparation for better jobs with the company. Draft boards provide a go-between in the program, since veterans are required to visit their boards as soon after their discharge as possible.

TOUGH! STRONG! SPLIT-PROOF RIDDLES

Prompt Delivery Any Quantity



THIS WON'T HAPPEN WITH A TRI-PLY

Tri-Ply Riddle Rims are made of 3-ply hardwood . . . will not bulge, break away, crack or leak sand through side of rim.

SEYMOUR E. PECK CO.
Tri-Ply
PATENTED

★ Six important features are found complete only in Tri-Ply Foundry Riddles. Each of these features adds to their efficiency and durability under the rigorous strain of day-in-day-out foundry practice. Check these six advantages, point for point, against the screening methods you are now using.

1. *Three-Ply Hardwood Rim* of laminated plywood will not split or splinter.

2. *No Crosswires* to slow the sifting process, and cause extra wear and tear.

3. *Smooth, Metal-Reinforced Butted Seam* eliminates bulky lap-joint. Stronger. Won't pry loose.

4. *Heavily Galvanized Wire Mesh* with full one-inch margin securely clamped between plywood rims and held by double row of clinched staples.

5. *Extra Heavy Three-Ply Hoop* stapled clear through rim and clinched on inside.

6. *Vertical Staples placed cross-grain* span more wood, hold tighter.

TRI-PLY foundry riddles are designed and built to give added months of useful service and at a cost no greater than the price of inferior riddles of poor design. Read the six important features listed at the right—six reasons why you can't afford to do without TRI-PLY riddles.

SEYMOUR & PECK
Company

P. O. Box 5609

CHICAGO, ILLINOIS

Book Review

Recommended Practice for the Sand Casting of Nonferrous Alloys, cloth, 159 pages, 6 x 9 inches, published by the American Foundrymen's Association, 222 West Adams street, Chicago. Price $3.00.

This book, compiled by the Recommended Practices Committee, Brass and Bronze Division, and the Committee on Sand Castings, Aluminum and Magnesium Division of the American Foundrymen's Association, brings into one volume the numerous suggested procedures to be employed in producing sand castings made from the various nonferrous alloys. The book is divided into 15 chapters of which the first describes the classification of cast copper-base alloys, and the second discusses practices with leaded red and semired brasses.

Chapters 3 and 4 are concerned with the methods of handling leaded yellow brass, and high strength yellow brass and leaded high strength yellow brass (manganese bronze). Tin bronze and leaded tin bronze; high-lead tin bronze; leaded nickel brass and bronze alloys; copper-silicon alloys, and aluminum bronze practices are described in succeeding chapters.

Chapter 10 is concerned with causes and remedies for defects in copper-base alloy castings while Chapter 11 deals with conforming specifications, Specific applications of copper-base alloys are given in Chapter 12. Chapters 13 and 14 provide information on various phases in the production of aluminum-base and magnesium-base alloy castings. Final chapter is a report of gating terminology prepared by the Committee on Nomenclature.

READERS' COMMENT . . .

Error in Tonnage

To the Editors:

We were very pleased to see our recent letter to you appear on the Readers' Comment page of the April issue of The Foundry.

May we call to your attention an apparent misprint with regard to the number of tons produced? If you will refer to our letter you will note that we mentioned our 1943 production as 3783 net tons, whereas 2783 tons appeared on your page. The averages seem to be correct, using our original figure.

Thanking you again for printing our letter we are,

Edgar A. Rowe

E. Rowe Foundry & Machine Co.
Martinsville, Ill.

Orders for Foundry Equipment Rise

Foundry equipment orders placed during March were the largest in 12 months, according to the index of the Foundry Equipment Manufacturers Association. The March index for total sales was 498.4, compared with 456.8 in February and 562.7 in March, 1943. The gain was accounted for entirely by sales of new equipment, the repair orders index declining slightly.

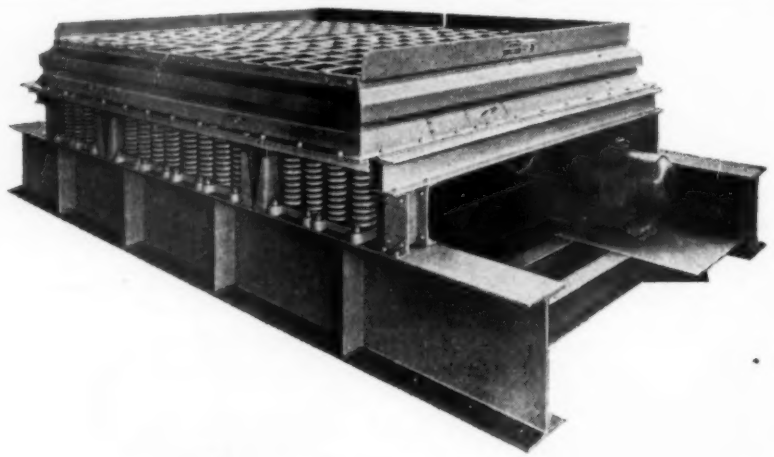
Kelley-Koett Opens New Offices

Kelley-Koett Mfg. Co., Covington, Ky., has opened a new sales office and service center for Cincinnati and southern Ohio in the Parklane Hotel Building, 108 Garfield Place, Cincinnati. Ted Tierney is company representative for the company in Cincinnati, Floyd Tracht is representative for southern Ohio, and Wayne Kruse is service representative.

Adventures of Bill

(*Concluded from page* 156)

bronze Buddha, 200 tons, June 1937, p.27; Great bell of Moscow, 19 feet high, 22 feet in diameter, estimated weight 220 tons, March 15, 1921, p.213; Bethlehem steel platen, 10 x 11 x 23 feet, 230 tons, Sept. 1, 1931, p.46; Adventures of Bill, Oct. 1943. On Jan. 15 of this present year the Bethlehem Steel Co. cast a 200-ton ingot mold, claimed to be the largest and heaviest casting of its kind ever made."



Five ton copes desanded in 35 seconds

At an eastern foundry, 5-ton copes 12 feet square are being desanded mechanically on a 10' x 12' Floatex Shakeout in just 35 seconds. When done with vibrators, in the past, it took three hours—plus a lot of hard manual labor.

But the speed of the Floatex operation is only one of the benefits it provides. The Robins Floatex Shakeout is the only genuinely full-floating Shakeout on the market. The entire load — flask and vibrating deck — is carried on heavy-duty coil springs. There are no eccentric shafts to snap, no rigidly fixed main bearings to crack. Because of this full-floating feature, no vibration escapes into the supports; the Robins Floatex shakes the flask—not the building.

Savings in manhours are vitally important today. Savings in damage to flasks and castings are mighty important at all times. You get both when you buy a Floatex. For complete details, write for Bulletin 124-F6.

Sizes are: Portable models to 17 ton capacity; Standard models for 1 ton to 100 tons or more.

ROBINS *makes:* BELT CONVEYORS • COAL AND ORE BRIDGES • BUCKET ELEVATORS • CAR AND BARGE HAULS • CAR DUMPERS • CAR RETARDERS • CASTINGS • CHUTES • CONVEYOR IDLERS AND PULLEYS • CRUSHERS • FEEDERS • FOUNDRY SHAKEOUTS • GATES • GEARS • GRAB BUCKETS • PIVOTED BUCKET CONVEYORS • VIBRATING SCREENS • SCREEN CLOTH • SELF-UNLOADING BOAT MECHANISMS • SKIP HOISTS • STORAGE AND RECLAIMING MACHINES AND SYSTEMS • TAKEUPS • LOADING AND UNLOADING TOWERS • TRIPPERS • WEIGH LARRIES • WINCHES • WINDLASSES

FOR MATERIAL AID IN MATERIALS HANDLING . . . . . *It's ROBINS*

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ROBINS CONVEYORS
INCORPORATED
Founded in 1896 as Robins Conveying Belt Co.
PASSAIC • NEW JERSEY

MATERIALS HANDLING MACHINERY

FOSECO PRODUCTS for BETTER CASTINGS

ALLOY	MELT with FOSECO	DEGAS with FOSECO
GUN METAL OR TIN BRONZE COMPOSITION MIXTURES	CUPREX OR CUPRIT	"R6"
PHOSPHOR BRONZE OR YELLOW BRASS	CUPRIT	"R8"
ALUMINUM BRONZE, MANGANESE BRONZE, OR SILICON BRONZE	ALBRAL	
MONEL, CUPRO-NICKELS, OR NICKEL SILVER	CUPREX	"R55"
COPPER & NICKEL ALLOYS (CONTAMINATED WITH ALUMINUM)	ALUMINUM REMOVER	
ALUMINUM ALLOYS (SAND CAST)	COVERAL	ALUMINUM DEGASER
ALUMINUM ALLOYS (VIRGIN DIE-CAST, PERMANENT MOLD)	COVERAL	ALUM. DEGASER FOSECO DIECOATS
ALUMINUM ALLOYS (COMMERCIAL DIECAST)	COVERAL	DYCASTAL FOSECO DIECOATS
ZINC ALLOYS (DIECAST)	ZINC COVERAL	
GRAY IRON, MALLEABLE IRON	IRON "R12" FEEDING COMPOUND	
STEEL, STAINLESS STEEL	STEEL "R1" OR STEEL CUPRIT FEEDING COMPOUND	

More and more foundries are solving their casting problems quickly, efficiently, and economically, by using FOSECO products. Why don't you investigate these products to make better castings? Write today, stating nature of problem and alloy you are casting.

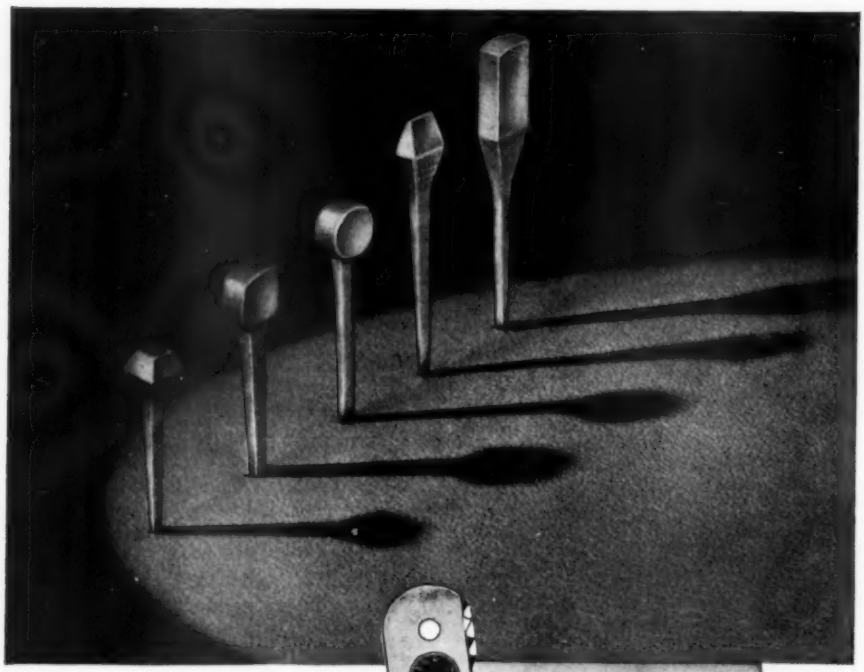
FOUNDRY SERVICES, INC. 280 Madison Ave., New York, N.Y.

Tour Adds Foundry Research Unit

Addition of a foundry research unit and an increase in staff have been made recently by Sam Tour & Co. Inc., New York. The research unit is in charge of an experimental foundry associated with a production foundry in New Jersey, operating on gray iron, brass, bronze and aluminum sand castings, permanent mold castings, and centrifugal and precision castings in bronze, aluminum and steel.

Recent staff additions of the company include: Fred J. Tobias, production engineer; Theodore Rubin, metallurgist; Robert Rogolsky, assistant metallurgist; Lewis W. Gleekman, assistant metallurgist, and Irving Olshever, laboratory assistant.

Mr. Tobias recently was production manager for Powder Metallurgy Inc., Long Island City, N. Y., and at one time was director of research and foundry operations for the Newton Die Casting Corp., National Lead Co. subsidiary, at New Haven, Conn. Mr. Rubin had been associated with Massachusetts Institute of Technology, and previously was connected with National Smelting Co., Cleveland. Mr. Rogolsky has had experience as a physical metallurgist and chemist in electroplating operations. Mr. Gleekman formerly was identified with the Mathieson Alkali Works' magnesium plant and with the Induction Heating Corp. Mr. Olshever is a graduate of the City College of New York with post-graduatae studies at Brooklyn Polytechnic Institute and New York University.

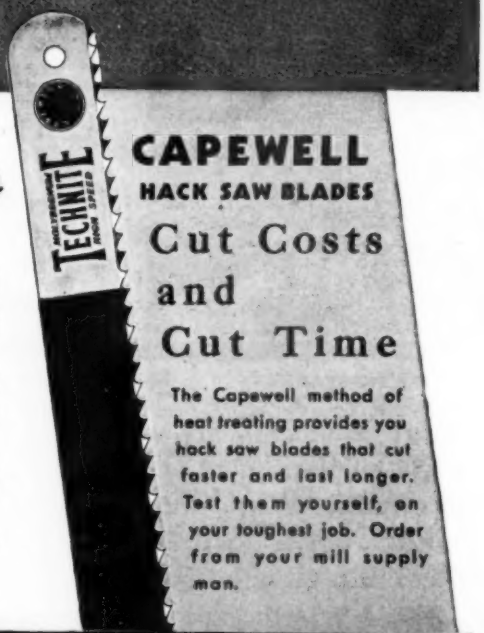


For Sound Castings

SMOOTH and CLEAN
CAPEWELL CHILL NAILS

They are *cold rolled* from the finest soft iron. The Capewell line is the most complete — with nails for every purpose and every size of casting. *Samples and prices promptly sent on request.*

THE CAPEWELL MFG. COMPANY
Hartford, 2, Conn.


TECHNITE
CAPEWELL
HACK SAW BLADES
Cut Costs and Cut Time
The Capewell method of heat treating provides you hack saw blades that cut faster and last longer. Test them yourself, on your toughest job. Order from your mill supply man.

CAPEWELL
CHILL NAILS • HACK SAW BLADES

Book Review

Alloy Cast Iron Handbook, cloth, 282 pages, 6 x 9 inches, published by the American Foundrymen's Association, Chicago. Price $3.25.

This is the second edition of a well known and authoritative work compiled by the Alloy Cast Irons Committee of the American Foundrymen's Association, and first published in 1939.

The material has been carefully reviewed and revised to bring it in line not only with the present efforts in conservation of alloys, but also to present a long-range viewpoint of the time when the critical situation relative to alloying agents no longer exists. While the book appears to contain only 25 pages more than the first edition, a slight change in arrangement actually has permitted the incorporation of 60 additional pages of text matter.

Important changes in addition to the careful revision which enhance the value and use of the book include a new chapter on ladle inoculants, more extensive references to boron as an alloying agent, and information on the effect of tellurium on chill. Bibliographies or references have been placed immediately at the end of each chapter instead of in a separate chapter at the end of the volume, as in the first edition.

The book contains 8 chapters and a 16-page index. First chapter deals with metallurgical principles of the effects of alloying elements in cast iron. The second describes the effects of alloying additions on cast iron while chapter 3 discusses the effects of alloys on the physical and mechanical properties of gray irons. Chapter 4 is concerned with ladle inoculants, and chapter 5 deals with white and chilled alloy cast iron. Heat treatment and foundry practice for alloy cast irons are discussed in chapters 6 and 7. Final chapter comprises an extensive list showing specific applications of alloy irons in various fields with data on compositions and physical properties. This latter compilation has been enlarged considerably, containing about 100 more uses than listed in the old edition.

Revise Safety Code

American Standards Association, 29 West Thirty-Ninth Street, New York 18, has published a revision of its Safety Code for Woodworking Machinery which sets minimum standards for safeguarding operators of various types of woodworking machinery. Copies of the code may be obtained for 35 cents each.

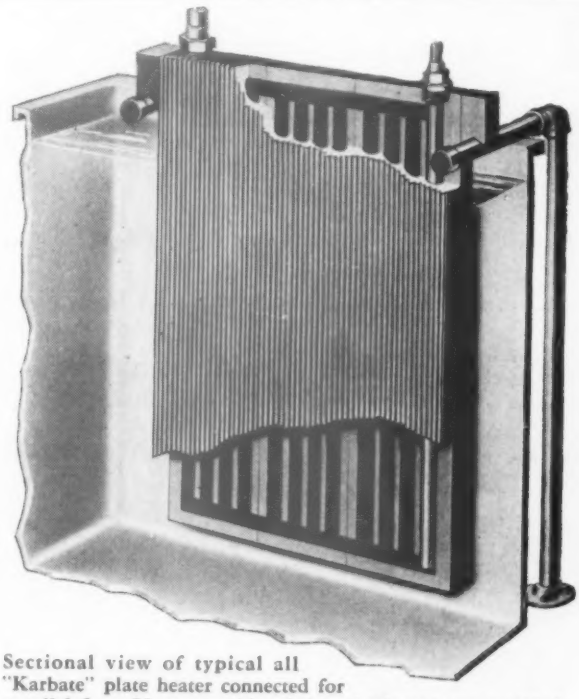
For Greater Serviceability

KARBATE

TRADE-MARK

PLATE HEATER

The "Karbate" Plate Heater is a new departure in heaters for pickling tanks, plating tanks or other services where heating, or cooling, of corrosive liquids is required. For greater serviceability through increased resistance to mechanical shock, special construction combines tubular channels in unit blocks of "Karbate" corrosion-resistant material.



Sectional view of typical all "Karbate" plate heater connected for parallel flow. Note assembly of three basic units to specified size and "Karbate" shoulders for support of heater. Other types of supports are available.

Features of the "KARBATE" Plate Heater

- **"Karbate" material is chemically inert . . . resists practically all acids, alkalies and solvents.**
- **Thermal conductivity of "Karbate" equipment is higher than that of most materials used for such installations.**
- **Fluted sides utilize principles of extended surface for greater heat transfer.**
- **Channels can be arranged in parallel or series flow for heating or cooling liquids.**
- **No dilution of tank contents.**
- **Sturdy construction minimizes maintenance costs.**

The "Karbate" Plate Heater is available in four separate design groups and 30 different combinations to meet almost any service requirement. Our representative will be glad to furnish details. Write National Carbon Company, Inc., Cleveland 1, Ohio, Dept. 37F.

The registered trade-mark "Karbate" distinguishes products of National Carbon Company, Inc.

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NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

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CARBON PRODUCTS DIVISION, Cleveland 1, Ohio, New York, Pittsburgh, Chicago, San Francisco

OFFICERS AND DIRECTORS

Elected by A.F.A.

RALPH J. TEETOR, president, Cadillac Malleable Iron Co., Cadillac, Mich., was elected president of the American Foundrymen's Association, and Fred J. Walls, International Nickel Co., Detroit, was made vice president at the annual meeting held during the recent Buffalo convention. Five new members were elected to the board of directors.

Directors to serve three-year terms include: Lee C. Wilson, Reading Steel Casting Division, American Chain & Cable Co., Reading, Pa., and immediate past president of the association; Ralph T. Rycroft, president, Jewell Alloy & Malleable Co. Inc., Buffalo; Frank J. Dost, vice president and secretary, Sterling Foundry Co., Wellington, O.; Joseph Sully, president, Sully Brass Foundry Ltd., Toronto.; and Samuel D. Russell, president, Phoenix Iron Works, Oakland, California.

RALPH J. TEETOR

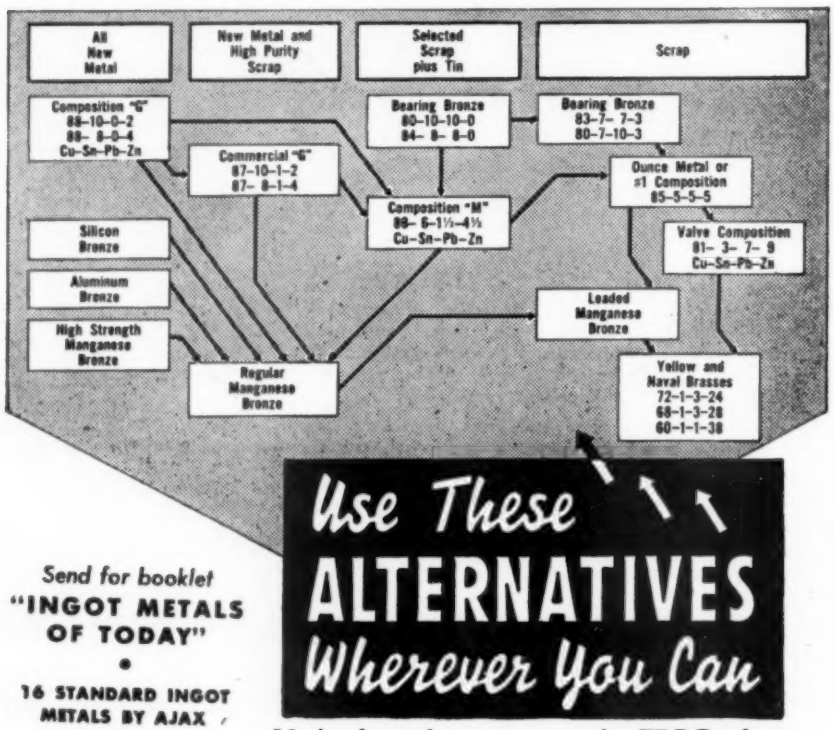
Ralph J. Teetor, president, Cadillac Malleable Iron Co., Cadillac, Mich., has been active in the affairs of the Malleable Iron Division Advisory and other committtes, and has presented several papers before annual conventions and in other ways has participated in the work of the association. He served as director for the term 1933-35. He also has served as a director of Western Michigan chapter. Mr. Teetor's higher education was obtained at Purdue University, Lafayette, Ind., from which he was graduated in 1905 with a degree in mechanical engineering. He became associated with Link-Belt Co., Indianapolis, where he rose to the position of chief engineer. In 1915 he was elected secretary of the Standard Malleable Iron Co., Muskegon, Mich. During the first world war he served as major of infantry and as division inspector. He was vice president and general manager Howe Chain Co., Muskegon, Mich., until 1921 when he established the Cadillac Malleable Iron Co., where he became secretary and general manager, and later became president.

FRED J. WALLS

Fred J. Walls, manager, Detroit office Development and Research Division, International Nickel Co., New York, served on the board of directors for three years 1939-1942, and as a member or chairman of the Gray Iron Division. In 1930 he presented the annual exchange paper of A.F.A. to the Institute of British Foundrymen. He was born in Oakland county, Mich., and received his technical education at the University of Michigan where he specialized in metallurgy. He was employed in succession by the Packard Motor Car Co., Detroit, and the Wilson Foundry & Machine Co., Pontiac, Mich., where he rose to the position of chief metallurgist in 1923. In 1932 he was consultant to Eaton-Erb Foundry Co., Vassar, Mich., now the Foundry Division, Eaton Mfg. Co., and acted as manager prior to assuming his present position with International Nickel Co., late in 1934. He was president of the Detroit Foundrymen's Association in 1933-34 before it became an A.F.A. chapter and later served as director of the chapter. He is active on committees of the Society of Automotive Engineers, American Society for Metals, American Society for Testing Materials and the Engineering Society of Detroit.

LEE C. WILSON

Lee C. Wilson, general manager, Reading Steel Castings Division, American Chain & Cable Co., Reading, Pa., and immediate past president, A.F.A., served as vice president and director in 1926-28. He has been active in association technical affairs, serving for many years as a member of the Steel Division Advisory Committee and as chairman of the Committee on Impact Testing. He has served as chairman of convention sessions, and as A.F.A. representative on


All New Metal
New Metal and High Purity Scrap
Selected Scrap plus Tin
Scrap
Composition "G" 88-10-0-2 88- 8-0-4 Cu-Sn-Pb-Zn
Bearing Bronze 80-10-10-0 84- 8- 8-0
Bearing Bronze 83-7- 7-3 80-7-10-3
Commercial "G" 87-10-1-2 87- 8-1-4
Ounce Metal or #1 Composition 85-5-5-5
Composition "M" 88- 6-1½-4½ Cu-Sn-Pb-Zn
Silicon Bronze
Valve Composition 81- 3- 7- 9 Cu-Sn-Pb-Zn
Aluminum Bronze
Leaded Manganese Bronze
High Strength Manganese Bronze
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Yellow and Naval Brasses 72-1-3-24 68-1-3-28 60-1-1-38

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ALTERNATIVES
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"INGOT METALS OF TODAY"

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16 STANDARD INGOT METALS BY AJAX

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax-Hamilton Gear Bronze
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE

*"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

Notice how the arrows on the W.P.B. chart point to the *right*. . . . They show how alternative materials *currently available* can be utilized by foundrymen as now permitted by many designers. The purpose is to conserve primary metal at the mine through increased use of secondary ingots. Sometimes great ingenuity is called for, yet remember this:

The first program for scientific control of ingot metal was set up by Ajax 45 years ago. The result has been metal and practical technical follow-through in which Ajax increases your production by reducing rejects.

THE **AJAX METAL COMPANY**
ESTABLISHED 1880 **PHILADELPHIA**

ASSOCIATE COMPANIES:
AJAX ELECTRIC FURNACE CORP. Ajax-Wyatt Induction Furnaces for Melting
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AJAX ELECTRIC CO., INC. The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP. Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

the A.S.T.M. committee E-1 on methods of testing. Mr. Wilson was educated in the schools of New Haven, Conn., and in the Sheffield Scientific School of Yale University from which he graduated in 1907. In the sales department of the Harbison - Walker Refractories Co., he represented this company over a period of years in Pittsburgh, Chicago, New York and New England districts. Later he joined the staff of the Chain Belt Co., Milwaukee as assistant to the vice president and became general sales manager. Transferring to the Federal Malleable Co., Milwaukee, as secretary, he later was elected vice president and general manager and held that position until he accepted his present post with the Reading Steel Casting Division.

RALPH T. RYCROFT

Ralph T. Rycroft is president of the Jewell Alloy & Malleable Co Inc., Buffalo. He is a past president of the Western New York Chapter of A.F.A., and has been interested in the affairs of the association for a number of years. He was one of the organizers of the Western New York Chapter, and is now serving on the board of directors.

FRANK J. DOST

Frank J. Dost, vice president and secretary, Sterling Foundry Co., Wellington, O., has served on several technical committees of the Gray Iron Division and as chairman of the Northeastern Ohio Chapter A.F.A. Born in Brooklyn, N. Y., he received his engineering education at the University of Cincinnati. In 1926 he became a student apprentice in the foundry of the Cincinnati Milling Machine Co., and in 1929 resigned to engage in alloy cast iron development as foundry engineer for Williams & Co. Inc., Cincinnati and Cleveland. In 1933 he became superintendent of Sterling Foundry Co., and recently assumed his present position. He has written extensively for the technical press on the subject of manufacture and use of high test alloy iron castings in machine tool construction.

JOSEPH SULLY

Joseph Sully, president, Sully Brass Foundry Ltd., Toronto, Ont., and past chairman of the Ontario Chapter of A.F.A., comes from a family of foundrymen. His father, Joseph Sully Sr., was a practical foundryman who served his apprenticeship in Belfast, Ireland. Mr. Sully was born in Toronto and received his education there and in Montreal. After a period with the Canadian Express Co., and later with C. A. Dunham Co. Ltd., Toronto, he organized the Sully Brass Foundry Ltd., in 1921. The business had been founded and operated formerly by his father. In 1929 his company became affiliated with Neptune Meter Co., New York and Toronto. Since 1921 Mr. Sully has been active in affairs of the American Foundrymen's Association, particularly those of the Canadian members.

SAMUEL D. RUSSELL

Samuel D. Russell, president, Phoenix Iron Works, Oakland, Calif., is a native of San Francisco and received his early education in the Oakland public schools. At the age of 12 he began his career in the foundry industry with the Phoenix Iron Works. For 6 years he worked as a patternmaker and later became a molder. Gradually he rose to positions of increasing responsibility. In 1926 he was made president of the company. Mr. Russell has been active in the interests of the A.F.A. for many years, particularly on the West Coast. He has served in various capacities as a member of the Northern California Chapter which he helped to organize and later served as chairman. He is a member of the American Society for Testing Materials and the Gray Iron Founders' Society.

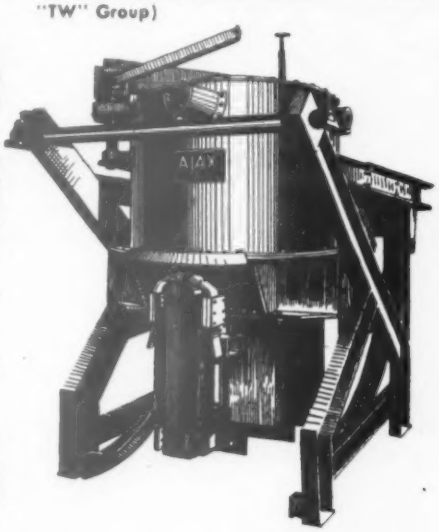
Malleable Production Up Sharply

Production of malleable iron castings increased sharply in March to the best level reported by the United States Department of Commerce. Output for reporting companies was 80,886 tons, against 74,371 tons in February, 78,143 tons in March, 1943, and 69,737 tons two years ago. Shipments rose from 72,631 tons in February to 80,629 tons in March. However, orders booked less cancellations more than kept pace, increasing to 89,445 tons in March, compared with 78,503 in February and 85,744 tons a year ago.

PLANTS NOW MELTING ALUMINUM ALLOYS ELECTRICALLY ENJOY THESE SPECIFIC ADVANTAGES...

1. **VASTLY INCREASED PHYSICALS (tensile strength and elongation) in foundry, die-cast, or rolling mill products.**
2. **DECREASED GAS ABSORPTION AND SEGREGATIONS hitherto due to conventional melting practice.**
3. **CLEAN-CUT, ACCURATE TEMPERATURE CONTROL during the melting and pouring stages.**
4. **GREAT EASE AND SIMPLICITY IN HANDLING ALLOYS that were once considered sensitive and difficult to melt.**
5. **ELIMINATION of oxide inclusions.**
6. **COOL AND CLEAN foundry operations.**
7. **DELIVERY of the rated production per hour on the hour, (production capacity 300 lbs. to 1250 lbs. per hour).**

This is the first commercial electric furnace for melting aluminum alloys in continuous operation. It utilizes the famous Ajax-Wyatt low-frequency induction melting principle which has been applied successfully for nearly all wrought brass melted throughout the world. Write for new bulletins . . . (The "TW" Group)



AJAX ENGINEERING CORPORATION, Box 1418, Trenton 7, N. J.

THE AJAX TAMA-WYATT INDUCTION MELTING FURNACE

ASSOCIATE COMPANIES:
AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

FOUNDRY SHOW ATTRACTS INTEREST

(*Continued from page* 115)

voted to scientific instruments for testing, control and inspection of processes and products. This feature again emphasized the fact that the entire industry is making remarkable technical progress, and that the production of castings is moving rapidly from an art to a science.

The Buffalo Preview of the exhibit, staged under the auspices of the Western New York Chapter of the A.F.A. on Monday evening, drew an estimated attendance of over 4000 foundrymen from the Western New York and Southern Ontario areas. These previews, which have been featured at the last four exhibits of the association, provide the opportunity for foundry workers in the district to see the exhibit as guests of the chapter. In this way men in the shop are participating in the educational features provided by the exhibition.

The list of exhibitors at the 1944 show, as presented in the official program, is as follows:

Adams Co.; Air Reduction Sales Co.; Ajax Electrothermic Corp.; Ajax Engineering Corp.; Ajax Flexible Coupling Co.; Ajax Metal Co.; Aluminum Refiners Div., Bohn Aluminum & Brass Corp.; American Air Filter Co.; American Allsafe Co.; American Crucible Co.; American Foundry Equipment Co.; American Optical Co.; American Photocopy Equipment Co.; American Steel Abrasives Co.; Arcade Mfg. Co.; Asbury Graphite Mills Inc.; Automatic Transportation Co.; Ayers Mineral Co.

Baker Perkins Inc.; Bartlett & Snow Co.; Beardsley & Piper Co.; Black, Sivals & Bryson Inc.; Blaw-Knox Co.; Bloomsbury Graphite Co.; Blystone Div., Standard Sand & Machine Co.; Bradley Washfountain Co.; Brickseal Refractory Co.; Briggs Mfg. Co.; Buckeye Products Co.; Buehler Ltd.; Buell Engineering Co.; Buffalo Forge Co.

Campbell-Hausfeld Co.; Canadian Radium & Uranium Corp.; Certified Core Oil & Mfg. Co.; Chain Belt Co.; Champion Foundry & Machine Co.; Chicago Pneumatic Tool Co.; Chisholm-Moore Hoist Corp.; Clearfield Machine Co.; Cleveland Pneumatic Tool Co.; Cleveland Quarries Co.; Climax Molybdenum Co.; L. S. Cohen & Co.; L. A. Cohn & Bro.; Columbus McKinnon Chain Corp.; Combined Supply & Equipment Co.; Conco Engineering Works; Conover Engineering Co.; Corn Products Sales Co.

Davenport Machine & Foundry Co.; Dayton Oil Co.; Delta Oil Products Co.; Wm. Demmler & Bros.; Despatch Oven Co.; Detroit Electric Furnace Div.; Kuhlman Electric Co.; De Walt Products Corp.; Harry W. Dietert Co.; Joseph Dixon Crucible Co.; Dougherty Lumber Co.; Allen B. DuMont Laboratories Inc.; Duquesne Smelting Corp.

Eastern Clay Products Inc.; Eastman Kodak Co.; Electro Metallurgical Co.; Electro Refractories & Alloys Corp.; Elwell-Parker Electric Co.; Engineering Sales Co.; Eutectic Welding Alloys Co.

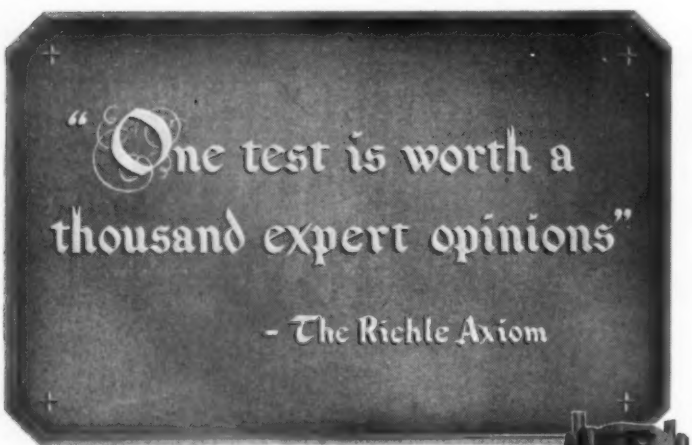
Fabreeka Products Co.; Federal Foundry Supply Co.; Federated Metals Div., American Smelting & Refining Co.; Fisher Furnace Co.; THE FOUNDRY; Foundry Equipment Co.; Fox Grinders Inc.; Foxboro Co.; Freeman Supply Co.; Fremont Flask Co.; Frontier Bronze Corp.

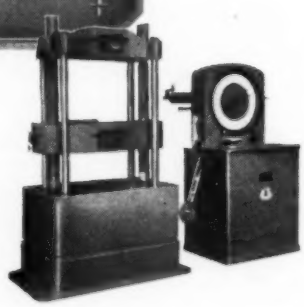
Gamma Instrument Co.; General Electric X-Ray Corp.; Globe Steel Abrasive Co.; Great Lakes Foundry Sand Co.; Great Western Mfg. Co.; Samuel Greenfield Co.

Hanna Furnace Corp.; Benjamin Harris Co.; Hercules Powder Co.; Herman Pneumatic Machine Co.; Hickman, Williams & Co.; Hill & Griffith Co.; Hines Flask Co.; Hoffman Foundry Supply Co.; E. F. Houghton & Co.; Hougland & Hardy, Hardy Sand Co.; Hudson Foundry Machine Co.; Hydro-Blast Corp.

Illinois Clay Products Co.; Illinois Testing Laboratories Inc.; Independent Pneumatic Tool Co.; Industrial Minerals Co.; Industrial Silica Corp.; Ingersoll-Rand Co.; Insto-Gas Corp.; International

(*Concluded on page* 252)





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All-out war production can't wait these days... and the minutes saved in a foundry bring V-day hours closer! America's foundries are turning out perfect castings faster than ever before... with Penolyn Core Oil helping to get perfect cores baked faster! Penolyn Core Oil is 100% dependable—hard binding, quick cleaning, holding gas-forming tendencies to a minimum. Penola engineers are helping too—on call whenever you need their experience!

DID YOU VISIT THE PENOLA BOOTH at the 3rd War Production Foundry Congress in Buffalo? If you did, thanks for stopping in to see us. If you missed the convention, and you have a foundry problem you'd like to discuss with us, drop us a letter.

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NEW YORK
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ST. LOUIS

(*Concluded from page 250*)

Graphite & Electrode Corp.; International Molding Machine Co.; International Nickel Co.; Ironton Fire Brick Co.

Jackson & Church Co.; Jeffrey Mfg. Co.; Johnston & Jennings Co.; Kindt-Collins Co.; Kolene Corp.; H. Kramer & Co.; Lancaster Iron Works Inc.; Lava Crucible Co. of Pittsburgh; R. Lavin & Sons; Lift Trucks Inc.; Link-Belt Co.

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Nassau Smelting & Refining Co.; National Carbon Co.; National Engineering Co.; National Gypsum Co.; New Jersey Silica Sand Co.; Newaygo Engineering Co.; Niagara Blower Co.; Niagara Falls Smelting & Refining Corp.; Wm. H. Nicholls Co.; Nichols Engineering & Research Corp.; North American Philips Co.; North American Smelting Co.; S. Obermayer Co.; Oliver Machinery Co.; Osborn Mfg. Co.

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Queen City Sand & Supply Co.

Radium Chemical Co.; Ramtite Co.; N. Ransohoff Inc.; Reliable Pattern & Castings Co.; Reliance Lead-Solder & Babbitt Co.; Republic Coal & Coke Co.; Republic Structural Iron Works; Robins Conveyors Inc.; Rochester Smelting & Refining Co.; Rotor Tool Co.; Royer Foundry & Machine Co.

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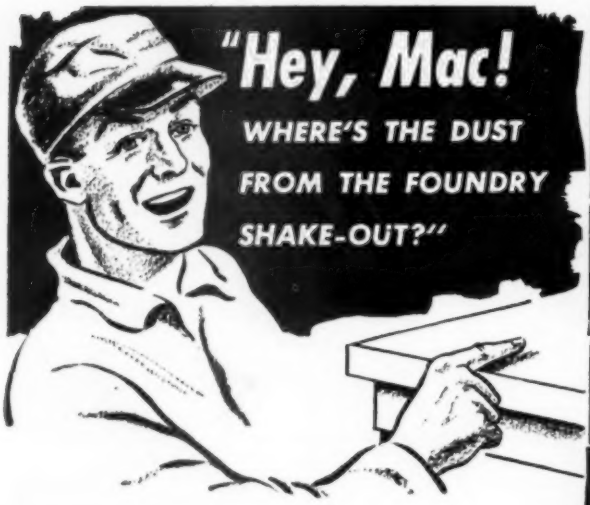

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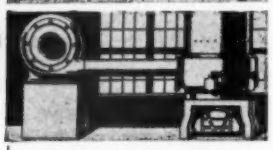
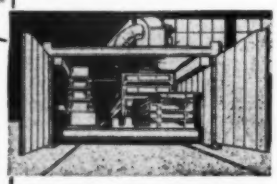
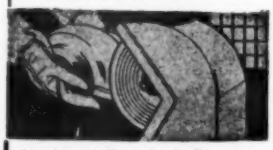


Sturtevant Cupola Blowers—assure smooth, constant pressure supply of air. Compact, simple, sturdy construction; sizes and types for all conditions.

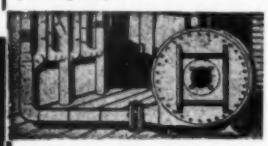


Sturtevant Core Oven Fans—handle dirty dust-laden air with no loss in efficiency. Shafts cooled by special "heat-slinger."



Sturtevant Dust Control—pioneer experience in engineered systems for collecting dust from snagging, tumbling and sandblasting operations.

Sturtevant Fume Control—efficient tailor-made systems for production foundries or low-operating-cost equipment for jobbing shops.



Sturtevant Compressors—hold air pressure constant, in supplying blast to oil or coke burners. Lifetime efficiency, minimum maintenance; worthwhile power savings.

There isn't any, Joe . . .

You see when Sturtevant designs, builds and installs a Foundry Shake-Out System there just *isn't* any dust, smoke or fumes to "smog" up equipment, working areas and slow down production.

FOUNDRY WORKERS are enthusiastic over the absence of dust when a Sturtevant System gets on the job. Maintenance men, too, are sold on the longer equipment life and low-man-repair-hours reflected in their record sheets.

Don't simply charge "dust costs" up to profit and loss. Eliminate them with a tailor-made Sturtevant System designed for your particular requirements—and custom-installed by a local engineer within quick beck and call. Sturtevant systems and equipment are created by men with an 80 year backlog of experienced-sharpened knowledge in cracking the toughest foundry problems.

And if you are interested in banning costly dust spread . . . boosting employee efficiency . . . cutting maintenance man-hours . . . protecting expensive, hard to replace machinery from grime and grit . . . check with Sturtevant! Let us show you—as we have many other management men—how a Sturtevant Foundry Shake-Out System gives *peak* performance at *lowest* operating cost—because of *greater* suction.

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Sturtevant
Puts Air to Work

Specifications Are Revised

Revised specifications issued by the Federal Specifications Board include QQ-B-621a for Brass, Commercial-Yellow, High-Copper-Yellow, and Naval Castings which supersedes QQ-B-621 issued in May, 1932, and QQ-B-726c for Bronze, Manganese; Castings (Including Manganese-Aluminum Bronze) which supersedes QQ-B-726b issued in July, 1942. Copies may be obtained for 5 cents each from the Superintendent of Documents, Washington.

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It's just as easy as it looks — no hard work at all for the operator — he can transport many tons daily by just guiding the load on this powered equipment to give you systematic materials handling.

Much lost motion is eliminated and time saved by setting bulk materials on skid mounted boxes or racks or huge pieces on skid platforms at the foundry and keeping them on skids throughout their subsequent handling.

Wide turning range — maneuverability in close quarters — exceptional ease of control.

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NO STRAINING-TUGGING-PULLING Nor PUSHING

POSITIVE MECHANICAL BRAKE CONTROLS IN STEERING HANDLE
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OXYACETYLENE USE IN THE STEEL FOUNDRY

(*Concluded from page* 122)

introduction of flame gouging for this purpose. Here again the operation is based on the ability of an oxygen jet to effect controlled combustion of heated steel. The actual speed of metal removal in this process depends on the size and depth of the defect. It has been estimated that the average defect is removed in three minutes, and this figure will vary greatly with the condition of the casting. To date, the average gouge observed has been approximately ⅜-inch deep, 2 inches long, and ¾-inch wide on top, allowing a flare to facilitate welding.

Fig. 8 shows a gouger and repair welder working side by side. Some idea of the nature and quality of the gouger's work may be had from Fig. 5. The welding itself has been improved recently by the introduction of new all-position alternating current electrodes which eliminate troublesome arc blow.

Flame gouging has one other noteworthy feature. Defects cannot be concealed inadvertently by the torch. On the contrary, defects which lie hidden in gouged areas are exposed by the heat of the flame.

Flame gouging often is the quickest way to remove fins of extruded metal caused by seepage of molten metal between cope and drag (or intermediate sections). Some large castings are molded with long, thin webs located at regular intervals over their entire surface to eliminate surface irregularities and cavities. Flame gouging is extremely useful here. In the most spectacular instance recorded, after all such webs had been removed from a large casting in 2½ days, an identical job was performed with the oxyacetylene torch and gouging tip in exactly 45 minutes.

The scale covering heat-treated steel castings emerging from furnace and quench must be removed in most instances. Rapid application of the oxyacetylene torch equipped with special descaling head is a quick way to remove all such scale. Where painting will follow, it dehydrates the surface of the casting, making possible a more intimate bond between paint and base. The flame heats the thin scale rapidly, leaving the underlying metal scarcely warm. The tremendous heat differential causes the scale to split and spall off, leaving a clean surface behind it.

Use Oxygen Lance

Fig. 6 shows a simple descaling operation with multi-flame tip. Single- and multi-flame tips of various styles and sizes are used, depending on the shape and size of the castings to be cleaned.

Many steel foundries use oxyacetylene lancing and, to a considerably lesser extent, "skin-drying." The former finds its widest foundry application in the piercing of tap holes in furnaces and ladles. Also, when heats are lost in the furnace and must be removed, they may be cut with the lance into sections of charging-box size. Also it generally is recommended, where heavy castings are to be cut through the center, that the oxyacetylene lance be used to pierce a hole on one side of the casting in order that the torch may cut through to the hole instead of having to make a cut through the entire thickness of the casting.

Increasing interest in and acceptance of appropriate oxyacetylene processes is widening the vista of immediate operational planning in many steel foundries. Together with continuing developments in molding and furnace operations, new oxyacetylene methods are aiding foundries in their present war job and brightening their prospect of future peace work. Some foundries, looking ahead, are turning also to welded fabrication, seeing in it an efficient, economical and versatile handmaid to casting. Several simple castings welded together may answer a given need as well as one large, complex casting and may answer it at much lower cost. Although some foundrymen are opposed to fabrication as an auxiliary process, others point out that it is potentially a valuable short-cut.

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FIRE CLAYS
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Valuable consultation is available with experienced engineers for the best use of fire clays in foundry bond and refractory service. They often supply important help for the reduction of foundry scrap losses.
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Make "your" next car of fire clay GOOSE LAKE
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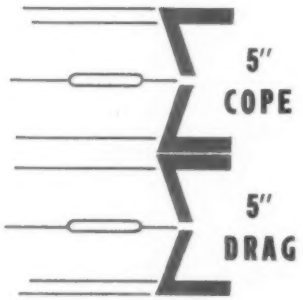
HINES ALUMINUM PRECISION FLASK

CAST ACCURATE MATCH PLATES

Note the large thumb screws for starting cope up.



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● Precision-built to last a lifetime. Machined perfectly true and parallel. Double round pins without clearance and without bind. Adjustments make it easy to keep in perfect alignment. Large thumb screws to start the cope up. Bars can be located at any position desired. Two men can lift the cope by hand with a perfect sense of feel when this light weight aluminum flask is rammed with sand. It's *the* flask for successful match plate casting.

THE HINES FLASK CO.

1324 HIRD AVENUE — CLEVELAND 7, OHIO

WATER QUENCHING OF STEEL CASTINGS

(*Continued from page* 131)

rack on the bottom of the car. This enables the car to be run out just far enough to clear the furnace and allow the door to be dropped down. The speed of the car is approximately ninety feet per minute.

Where there is more than one casting on the car, or in the case of racks where there are from three to four racks on each car, the car is run out only far enough to allow the hooking on to the front rack. The car then is run back into the furnace and the door closed in order to equalize the temperature of the balance of the load. The total time is not over 2 minutes from the time the door is opened until the quench load is immersed in the water.

In order to prevent warpage of intricately designed, or large, castings, it is necessary to use considerable care in blocking up the casting on either the car or the rack, as the case may be. The particular design being quenched is studied so that it may be loaded in such a manner as not to pocket any steam during the quenching and not to pocket any water upon lifting it out of the quenching media. In addition to the agitation caused by the circulation, it is also the practice, whenever possible, to keep the quench load continually moving back and forth in the quench tank in order to break up the steam film on the casting surface.

Various sized quenching tanks are at hand, ranging from 10,000 gallons to 40,000 gallons capacity. These tanks are designed so as to be wider just below the floor level. This allows a greater capacity with a minimum of floor space required; and as the tanks are located in front of and between the heat treating furnaces, it is necessary to keep as much clearance between the car and the tank as possible, both as a safety measure and to aid hooking onto the load.

Water Temperature Controlled

The temperature of the water is controlled by circulating it through cooling towers, the cooling tower consisting of a tower on which there is a series of splash pans. The hot water from the tank is pumped into the top of the tower and is sprayed down over the series of splash pans. As an added control there is also a fan in the top which pulls air up through the tower. The control of the fan depends on the temperature of the water being pumped from the tank. There are various sizes of cooling systems, depending on the size of the quenching tank, but they vary from 500 gallons per minute circulation to 1200 gallons per minute. Assuming a water temperature of 90 degrees at the start of the quench, the usual rise with a normal load is approximately 25 degrees maximum, a normal load being approximately 35,000 pounds maximum in the case of miscellaneous castings quenched on racks. It is impossible to give figures on the average weight handled in one heat treating furnace, due to the large variations in size and design. In some cases of extreme design the weight per volume is very small.

Timed and intermittent quenching are used to a great extent on most of the normal quenching operations, due to the fact that most of the quenched designs are such that they have both heavy and light sections, and also usually have quite abrupt changes in the sections. In order to utilize this procedure to the fullest extent it is necessary to control the type of loads, in that if quenching on racks is to be done, it is necessary to have similar castings on the rack.

In intermittent quenching the load is quenched over-all for a predetermined number of seconds, after which it is lifted out of the quench bath and allowed to uniform. This allows the hotter sections to transmit heat to the cooler, thinner sections, thereby more nearly uniforming the temperature gradient in the casting. It is then quenched again down to the proper temperature.

In the case of straight time quench-

(*Concluded on page* 258)

SYMBOL of SERVICE
Since 1890

★ Long before the term "expediter" came into general use, we of Hickman, Williams had "expedited" countless industrial transactions. But, more important, we have been relied upon throughout these years to help solve problems dealing with ferro-alloys, pig iron, coal, coke, shot and grit

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Call on us at any time. We are anxious to demonstrate our ability to serve you.

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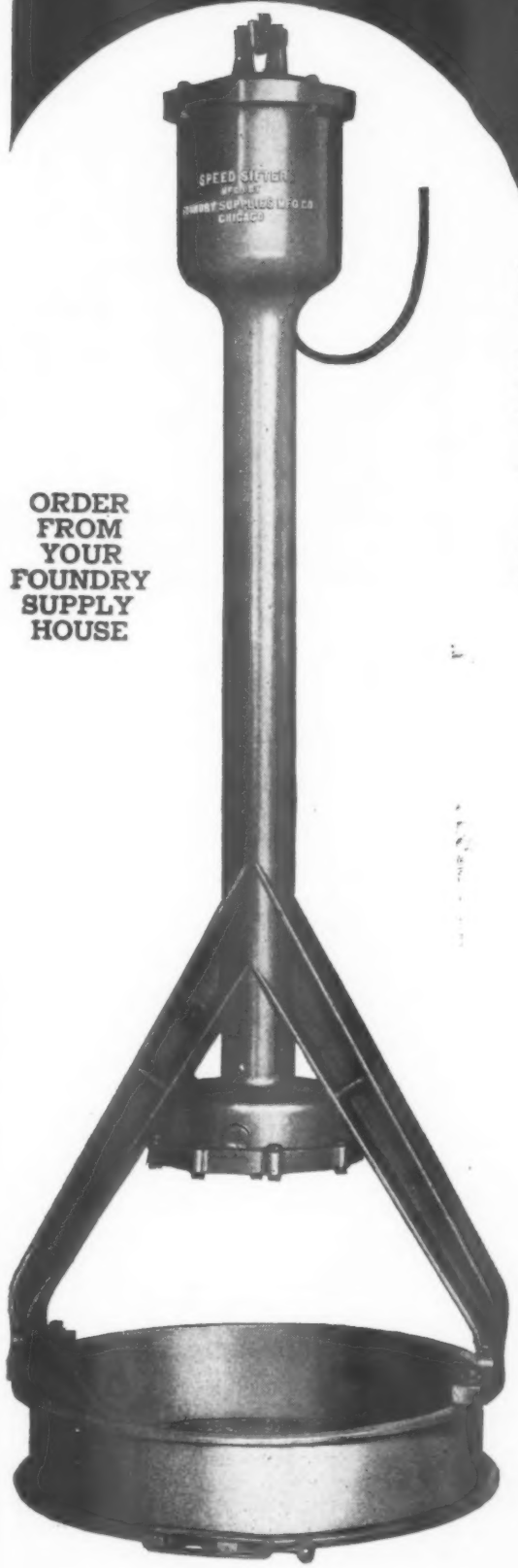

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Steel-mounted sieves instantly interchangeable. No jagged screen edges, no storage problem. 20 in. diameter clear sifting area.

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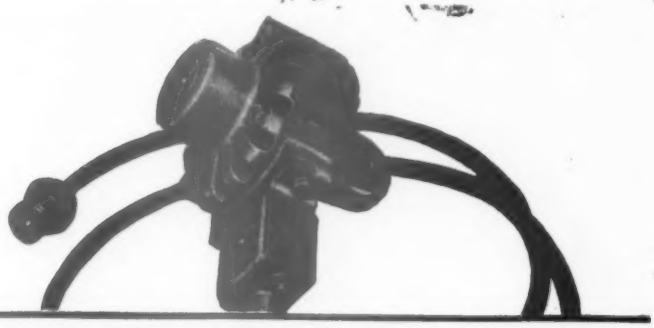
$175.00 f.o.b. Chicago—complete with cable, safety ground wire, one sieve (2-4 mesh). Standard ⅓ h.p. motor, 115-230 volts 60 cycle single phase.
Prices with other motors quoted on request.



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True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

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No. 2—Medium match plate 13.00	No. 9—Machine and heavier 24.00

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2221 Orchard Street Chicago, Illinois

CABLE ADDRESS: "ROTOPLANE CHICAGO"

(*Concluded from page* 256)

ing, this being done on castings of simpler design than in the intermittent quench, it is merely given a single quench which, known from previous experience, will cool the castings down to the proper quenched temperature.

The main difficulty encountered with either timed or intermittent quenching is to be able to quench to get the maximum properties from the alloy being used without causing excessive quench cracking. One method which has been found very successful—in addition to the timed or intermittent quenching—is that of blocking off various critical sections. If the design is such that there are thin sections that persist in cracking, even with timed or intermittent quenching, it is the practice to block these sections off in two ways. In some cases the position of the casting as loaded and quenched will allow the critical sections to be blocked off with fire clay, or fire clay and asbestos.

In other cases it is necessary to make fixtures that fit around or on the critical areas. It has been found that in order to get effective results from blocking off, it is necessary to have perfect contact between the fixture and the casting section, and wherever possible these joints are sealed up with fire clay or fire clay and asbestos.

One very important consideration in the quenching of miscellaneous steel castings is that the quench loads must be of such a size and character that the quenching media will contact all the castings involved in the load. If the castings are piled too close together on the rack, one then has the equivalent of a much heavier section and the outside castings will not get the proper quench and the castings on the inside of the load will not get any quench.

After quenching the casting, or the rack of castings, it is set on the floor until the entire furnace load has been quenched. The car is then run out and the car and furnace allowed to air cool until they are below approximately 600 degrees Fahr., in the case of higher alloy castings; or below 1100 to 1000 degrees Fahr. in the case of lower alloy castings. Where the alloy of castings is such that there is danger of retained austenite the castings are allowed to cool down to 250 degrees Fahr., or under, either by air cooling or by subsequent quenching before reloading into the draw furnace.

Use Careful Blocking

The castings are then loaded back on the car and properly blocked or, in the case of the racks, the castings are checked to see that any blocking done before loading for the quench has not come loose or shifted. If so, it is reblocked.

It should be emphasized again that much can be done in keeping water quenched castings from warping by carefully loading and blocking both for the quench and for the draw treatments.

The daily heat treating production contains castings up to 18,000 pounds. However, castings as large as 80,000 pounds are quenched regularly, and the largest casting to be quenched by this company weighed approximately 88,000 pounds.

The problems of water quenching of miscellaneous steel castings can be listed as follows: Care in loading to get uniformity of loads. Positioning of the castings so as to eliminate steam or water pocketing. Spacing of the castings to get maximum effect from the quenching media. Adequate blocking to prevent warpage. Blocking off of sections critical from the standpoint of quench cracking. Uniformity of heating and holding temperatures. Speed of getting quench load from furnace into the quenching media. Proper quenching practice to get maximum properties from the steel used.

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LABORATORY SERVICE

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Accuracy, rapidity, and reasonable cost characterize KAWIN FOUNDRY ADVISORY, METALLURGICAL, AND LABORATORY SERVICE. Tests available in unit or agreement basis. We invite inquiries regarding the manner in which this will fit into your operating program. Materials regularly tested for foundry clients are—

IRONS	ALUMINUM	COKE, COAL	MINERALS
STEEL	WHITE METAL	FUEL OIL	SAND
BRASS	BABBITT	FLUXES	CORE OIL

We provide facilities for mailing samples. Reports made by code, wire, telephone, or mail as you wish.

Over 40 years' experience in all types of foundry work. Why not drop us a line and learn how we may serve you by our well rounded organization?

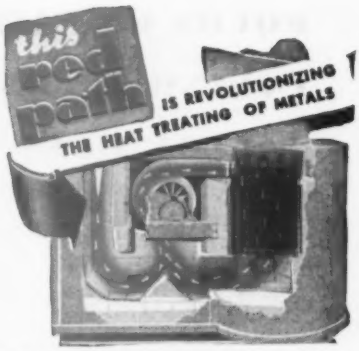
Chas. C. Kawin Company

Chemists—FOUNDRY ENGINEERS—*Metallurgists*

CHICAGO—431 So. Dearborn BUFFALO—110 Pearl St.

Hear Design Engineer

H. W. Kelly, design engineer, the Meehanite Research Institute, recently addressed an informal gathering of staff and foundry personnel of the Vancouver Engineering Works Ltd. at the Hotel Vancouver, Vancouver, B. C. Mr. Kelly gave an illustrated talk on the applications of sound principles to casting design.



With the charge confined to a small area, fan-driven hot air at high velocity permeates the entire charge evenly, practically eliminating distortion, saving a great deal of space, and allowing quenching of the entire load without removal from the fixture.

heat full loads evenly in the Super-Cyclone

then quench 'en masse' to uniform hardness throughout

The Lindberg Super-Cyclone is a versatile and prodigious worker. Its ability to heat full loads to precise temperatures quickly and evenly throughout the charge increases production greatly, keeps work straighter, and allows in the same furnace either normalizing or annealing, hardening, tempering.

In hardening mass loads it was necessary to design quenching facilities to suit. The Super-Cyclone charge goes directly into the quench where oil is circulated under pressure right through the mass. Ample storage provides fresh cool oil and quenching is uniform throughout the load.

Each charge, fixture and all, is heated and quenched, with a saving in time, man-power and space requirements.

Write for complete information to Lindberg Engineering Company, 2453 W. Hubbard Street, Chicago 12.

LINDBERG FURNACES

ARMY E NAVY

SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening

POURS FINNED CYLINDERS OF ALLOY IRON

(*Concluded from page* 119)

foundry they are placed on the pouring conveyor so that the sprue openings face upward. Long runner basins containing the required number of sprue holes are set in place and carefully mudded. Usual assembly of molds is about 12 inches square and 40 inches long. As may be observed in Fig. 3 the runner basin extends almost the full length of the assembly. The runner basin contains a dam at the end where the molten iron is poured. This holds back any dirt or slag and permits only clean iron to flow into the sprue openings.

Pouring conveyor in the foundry is oval in shape, and of the plate type. It is about 85 feet long and 40 feet wide with a total length of approximately 250 feet. Pouring is done in front of the cupola using barrel-type covered, and open type, tea pot spout ladles. Both types are insulated, and have a capacity of 1600 pounds which constitutes a complete charge of iron melted in the cupola. As mentioned earlier two types of alloy cast iron are used for pouring the castings depending upon the type, and service requirements. Consequently, the types of castings are placed in the proper sequence on the conveyor so that they are made from the correct iron composition.

Through experimental work the proper pouring temperature for each type of casting has been developed, and those are observed carefully. Pouring temperatures of the molten metal are taken as it comes over the spout, and it is allowed to cool in the ladle to the proper point. Then as the nrst mold is poured another temperature determination is made and recorded with the mold number. Similarly a temperature measurement is made on the last mold poured from the ladle, and that is recorded with the mold number. Consequently, the records can be checked back at any time to determine whether or not a specific casting was poured at the right temperature.

In addition to temperature determinations, other control tests are conducted on the iron. One is the pouring of chill test bars on every ladle of iron taken from the cupola, as shown in Fig. 4. Those are fractured, a record made of the chill depth, and a specimen placed on the rack shown on the wall. The rack is divided into 6 compartments, one for each day of the week which permits re-examination if any question arises. Standard arbitration test bars 21 inches long and 1.2 inches in diameter are cast from each ladle, and specimens from those are subjected to tensile strength determinations and chemical analyses.

Consequently, it may be seen that the production of alloy cast iron finned cylinders and heads requires close control throughout. First a careful study is made of the casting to determine the best molding procedure to follow, and the arrangement of gates and risers. That also involves the selection of the most suitable facing and backing sands. Then a number of pilot castings are made and studied to see whether any changes are needed, or whether improvements can be made in any phase. If any changes are made new pilot castings are made and studied, otherwise the pattern is placed into production.

For BETTER FOUNDRY SERVICE

The Clear-Vue MODEL DUSTFOE RESPIRATOR

- Attractive Appearance.
- All-Plastic Facepiece and Filter Container.
- Lightweight—Compact—Comfortable.
- Approved by U.S. Bureau of Mines for Protection against All Dusts.
- Transparent—filter seal, etc., can be checked without disassembly.

Now made of strong, *transparent* plastic—compact, durable, odorless, non-corrosive, non-conductive of heat or electricity—the Clear-Vue Dustfoe Respirator retains its original advanced design features while providing new practicality in foundry service. Condition of filter, filter type, adjustment, seal, and state of cleanliness can be checked at a glance without disassembly. Get the facts in Bulletin No. CM-6!

MINE SAFETY APPLIANCES CO.

BRADDOCK, THOMAS AND MEADE STREETS · PITTSBURGH, PA.

District Representatives in Principal Cities

Services Offered by SWPC Outlined

Smaller War Plants Corp., Washington, has prepared a booklet summarizing the services small manufacturers may receive through that organization. Among other services it outlines procedures for assisting businessmen in evaluating and obtaining access to patents held by the Alien Property Custodian and the possible new products and inventive ideas submitted to other governmental agencies. Copies of the bulletin may be obtained from any of the 115 SWPC field offices or from headquarters at First and Indiana avenue, Washington 25.

BELIEVE IT OR NOT, THIS ONE FITS MOST ANY FOUNDRY
ONE OF THE SLICKEST THINGS IN THE SHOW!
I'LL BE DOG GONNED! LOOK AT THAT GOOD GRIT PILE UP!
ONE OF THESE WILL TICKLE OUR BLASTING ROOM BOYS!
YEH- AND I'VE BEEN PAYING PLENTY FOR GRIT AND NOW I CAN MAKE MY OWN
I EVEN HEARD 'EM TALKING ABOUT IT ON THE THIRD FLOOR AT THE STATLER!
FOR CRYING OUT LOUD, WE HAVE BEEN THROWING THAT GOOD GRIT OUT!
LOOKS TO ME AS IF THIS WILL PAY FOR ITSELF QUICK!
OVERHEARD at the FOUNDRY SHOW IN BUFFALO.

AJAX SHOT SCREEN

AJAX

WRITE FOR COMPLETE DOPE ON AJAX SHOT RECLAIMING SCREENS, ALSO AJAX LO-VEYORS FOR HANDLING SAND and OTHER DRY AGGREGATES . . . . . .

AJAX FLEXIBLE COUPLING CO.
WESTFIELD, N.Y.

MODERNIZATION INCREASES PRODUCTION

(*Continued from page* 133)

est foundry is surprisingly high. Temperatures, equipment capacities, power consumption, and number of employes required for equipment operation and for material handling between operations, also can be noted on the flow chart.

Having available the general arrangement drawing and the flow chart the foundryman now can approach the problem of increasing production with certainty and with complete knowledge that his decisions will place correct equipment in positions favorable for flow and future expansions. He also will know that serious underground construction will be avoided wherever possible, or if unavoidable, will be justified economically.

Estimates of new equipment installations then should be made. With this information the economics of the whole project is then ready for study. On the one hand, as noted on the "flow chart", are the employes required in the present arrangement; on the other hand, is first cost, maintenance cost, operation cost, and employe requirements for the new arrangement. This data then is compared with the production under the two conditions. With this before-and-after picture tabulated, the foundryman and his engineers or consultants may determine quickly whether the new installations are justified economically.

Building, enclosing the space in which the foundry equipment operates, must protect workers and equipment from the elements. If present buildings perform this basic function simply and as permanently as possible, they fulfill their fundamental purpose.

Unfortunately, most older buildings were not built around the foundry process; rather the process was introduced into a pre-conceived or existing structure. Additions, peculiarities of the site, and changing processes, all contribute to a general condition of complexity where columns are in the way, floors are not consistent, cranes are not high enough, and roofs are so cut up and complicated that no amount of maintenance will keep out the weather.

Foundrymen generally are inclined to get along with existing buildings as best they can, but they are not always using the best judgment from an economical standpoint. There are numerous cases where minor changes, and even completely new buildings, are economically necessary.

Changes Save Costs

Apart from the main issue, which is to make the building fit the process, there are numerous instances where maintenance dollars may be saved through incidental building changes. An example is the replacing of the too high and too narrow monitor with a continuous metal ventilator. Here, positive gravity exhaust will be effected in place of ineffective ventilation, and equally ineffective natural light. Each building situation is, of course, a special case requiring thorough study.

Justification of proper heating and ventilation are found in the elimination of the following undesirable conditions:

(1) Obnoxious gases particularly in the core room and around pouring operations.
(2) Moving of smoke from one area to another in the foundry and excessive drafts.
(3) Poor workmanship on delicate work because of cold hands and tools.
(4) Inefficient work by employees wearing too many clothes.
(5) Excess moisture in cores if allowed to stand for a considerable time in low temperature air.
(6) Frost covered patterns which cause sand stickiness.
(7) General tendencies to do little or no work until the temperature rises to a satisfactory level.

To provide a 60 degree Fahr. temperature, which is desirable to overcome the efficiency losses previously described,

(*Continued on page* 264)

New Air Tool Drives "blind" Rivets Accurately... Automatically

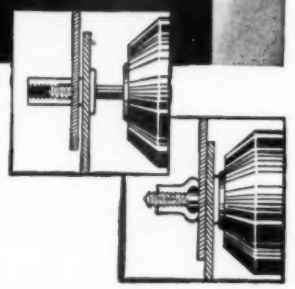
Installing "blind" RIVNUTS quickly with precise, positive upset while working entirely from one side is now possible with the recently developed Auto RIV-Driver. Completely automatic, the tool runs a threaded mandrel into a Rivnut, upsets it, backs the mandrel out and stops the tool. Operators simply press a throttle; make no manual adjustments for any operation. Rivnuts are installed 6 to 8 times faster than formerly; rejects are almost completely eliminated.

The tool can be adjusted to upset at any depth required. Once set, adjustment is tamper-proof—every Rivnut is driven accurately and uniformly. An indicator on the tool handle lights when the upset is correct; does not light if Rivnut is improperly headed.

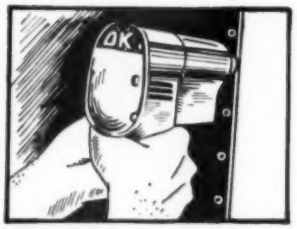
Powered by compressed air, the Auto RIV-Driver weighs just 4¼ pounds; is 9½ inches long; balanced for efficient handling by women operators.

You all know that our fighting men need the finest quality materials that we here at home can produce. That goes for Wrigley's Spearmint, Doublemint and "Juicy Fruit" chewing gum, too. Our stock pile of raw materials that goes into the making of Quality chewing gum is getting lower and lower. Until we can again build up our raw material inventory, we are sending all of our limited output of Quality chewing gum to our fighting men and women overseas, only.

You can get complete information from the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago 6, Ill.



Rivnuts (mfd. by B. F. Goodrich Co.) are internally-threaded tubular rivets which can be installed "blind" while working entirely from one side of the job.



Automatic action, positive depth control and visual indicator assure correct and uniform installation of rivnuts with new Auto RIV-Driver

Y-117

Foundry men use Maehler CORE OVENS for

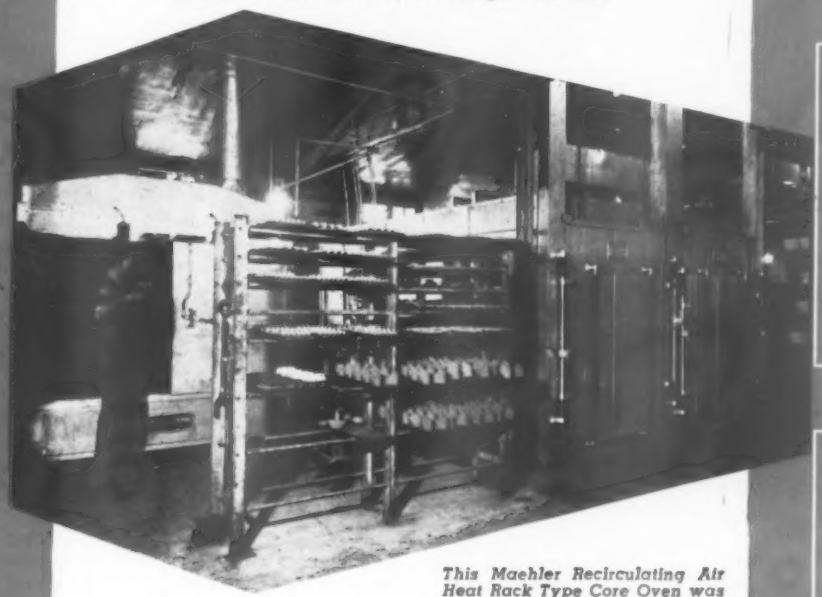
. . reducing core baking time!
. . producing more evenly baked cores!
. . eliminating smoke in the core room!
. . cutting operating costs!

Foundries equipped with Maehler core and mold ovens are better able to meet today's production schedules and at the same time produce more uniformly baked cores. One of the big advantages of Maehler ovens is the re-circulating air heat principle which assures exceptional heat uniformity. (Recent tests show uniformity within 10° F. in a fully loaded oven operating up to 500° F.) This kind of temperature control means cores that are uniformly baked with no burning.

Maehler core and mold ovens are available in a complete range of oil fired, gas fired and electrically heated units. We are in a position to handle your immediate needs as well as your postwar requirements. Write us today.

THE PAUL MAEHLER COMPANY

2200 W. Lake St., Chicago 22, Ill.



This Maehler Recirculating Air Heat Rack Type Core Oven was installed to replace six brick drawer type ovens at Chambers, Bering & Quinlan, Decatur, Illinois. The success of this installation led to three additional Maehler ovens for this customer.

MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.

HERE'S THE EVIDENCE OF MAEHLER CORE OVEN SUPERIORITY

BAKING TIME CUT 65%!

After installing a Maehler Air Heat Oven The Blackmer Pump Co. of Grand Rapids, Michigan reported baking time for small cores reduced 65% —for large cores 30%!

ONE DOES THE WORK OF FIVE!

One double-compartment Maehler Lift Door oven replaced five old core ovens at the Harnischfeger Corporation, Milwaukee, Wisc.

GREATER CAPACITY, LOWER COST!

The Detroit Brass & Malleable Works reported that their Maehler Recirculating Air Heat System on a six compartment metal oven they obtain perfect cores — have increased capacity and lowered costs.

ONE REPLACES FIVE!

One 6' x 8' x 7' Maehler Core Oven replaced five coke heated brick ovens of almost the same size for an owner in Wayne, Michigan.

(*Continued from page 262*)

it is not always necessary to install a complete boiler plant. A less expensive, but equally efficient scheme, employs unit space heaters. These units, placed near the points of greatest need, supply the plant with heated fresh air taken from the outside. They may be gas, oil, or coal-fired, and are low in first cost. Heat, as well as some ventilation, is provided. On summer days, unheated air may be blown into the plant through the same unit. Direct duct connections may be made to portions of the foundry needing more heat or ventilation, and time controls may be utilized to turn on the units at a predetermined time of the day or night as is required.

Engineers familiar with such installations should be consulted in order that the heaters are placed to obtain proper heating as well as ventilation.

Many industrial specialists and consulting engineers regard adequate lighting by modern standards as one of the greatest single improvements which can be added to existing foundries for the increase of production. Proper lighting influences foundry production and costs in many ways. Here are a few good examples:

(1) Extra time spent in seeing details of molds and cores when repeated frequently by many molders soon runs into important hours wasted.

(2) Less scrap from physical reasons is traced directly to better seeing conditions.

(3) Older and valuable men, instead of being transferred to some less exacting job as their eyesight becomes less keen, are able to continue at their regular jobs.

(4) Less eyestrain results in fewer headaches and consequently better morale.

(5) Better seeing and, therefore, quicker reactions against danger result in fewer accidents.

(6) Fewer dark corners mean better housekeeping which in turn results in pride in workmanship.

Although each plant, and even each operation, demands special attention for correct illumination, a standard of 35 foot-candles for molding and coremaking areas is considered average.

Toilet, shower, locker, washroom and lunchroom facilities indicate immediately to employes, customers, and visitors alike, the regard that the management holds for its employes. Plans for higher standards of orderliness should include the installation of such facilities. Beside the evident result of raising employe morale, there are certain definite advantages to management in improved employe efficiency. The single, centrally located locker room, locked except during lunch periods and during the change of shifts, definitely prevents loitering and eating at odd times. The lunchroom, separate from the adjoining locker room, also can be used for foremen's meetings, the instruction of employes during training, safety councils, and for holding other pertinent group meetings.

Need Good Floors

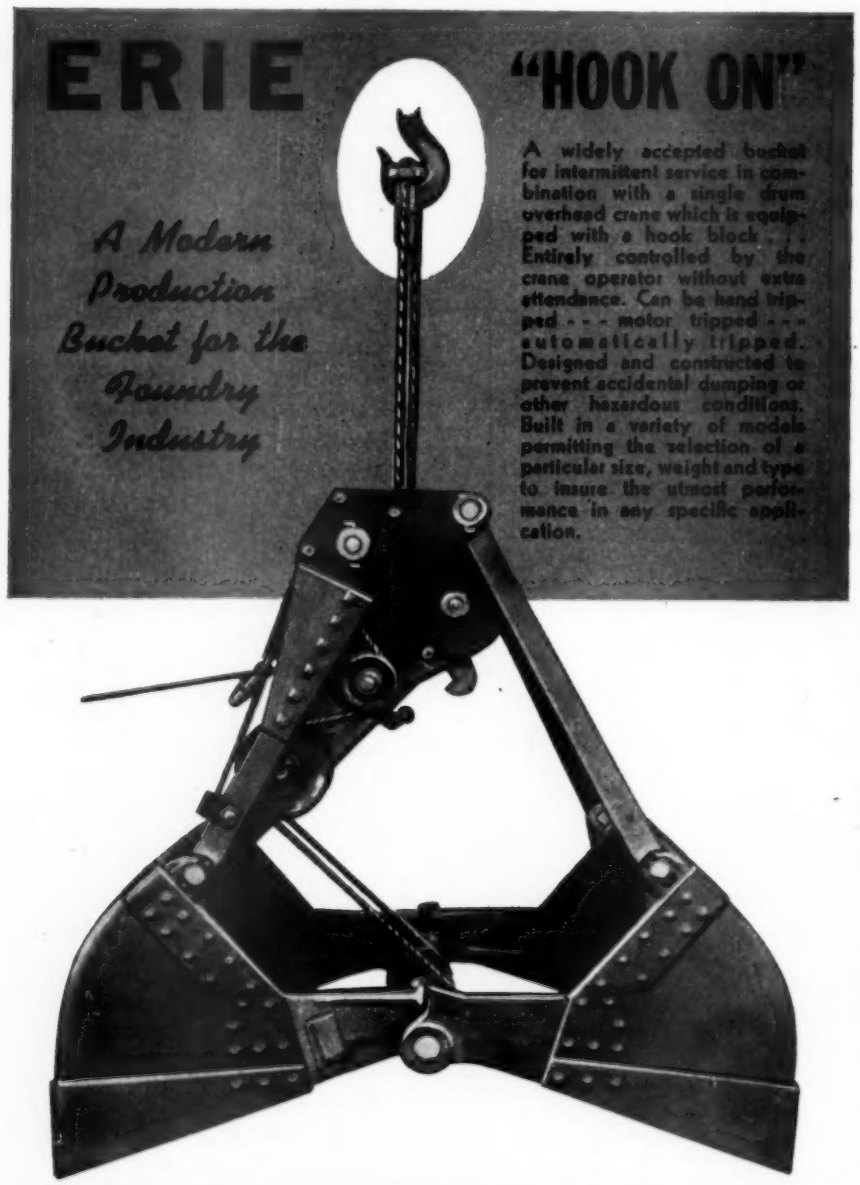
All of these facilities should be grouped together for economy of construction and also to simplify the general arrangement of the foundry. They should be adequate to fulfill the demands of state codes.

In any foundry a concrete floor is of utmost importance. Its installation provides a psychological aid in that a clean start may be made toward new standards of orderliness. Other advantages are numerous, including fewer accidents because of better footing, and less sickness because of drier working conditions. Probably most important, labor is reduced, since the concrete floor is a definite point to work from when moving or piling sand.

To prevent spalling resulting from contact with hot metals, mill pavers can be laid over the slab in hot metal areas. In order that this area may be as small as possible to avoid excessive installation cost, studies should be made of the plant layout to organize a pouring area which probably will be an aid to increasing production.

More primitive methods rarely can be found in any industrial field than those often used for charging the cupola. This situation in smaller operations sometimes

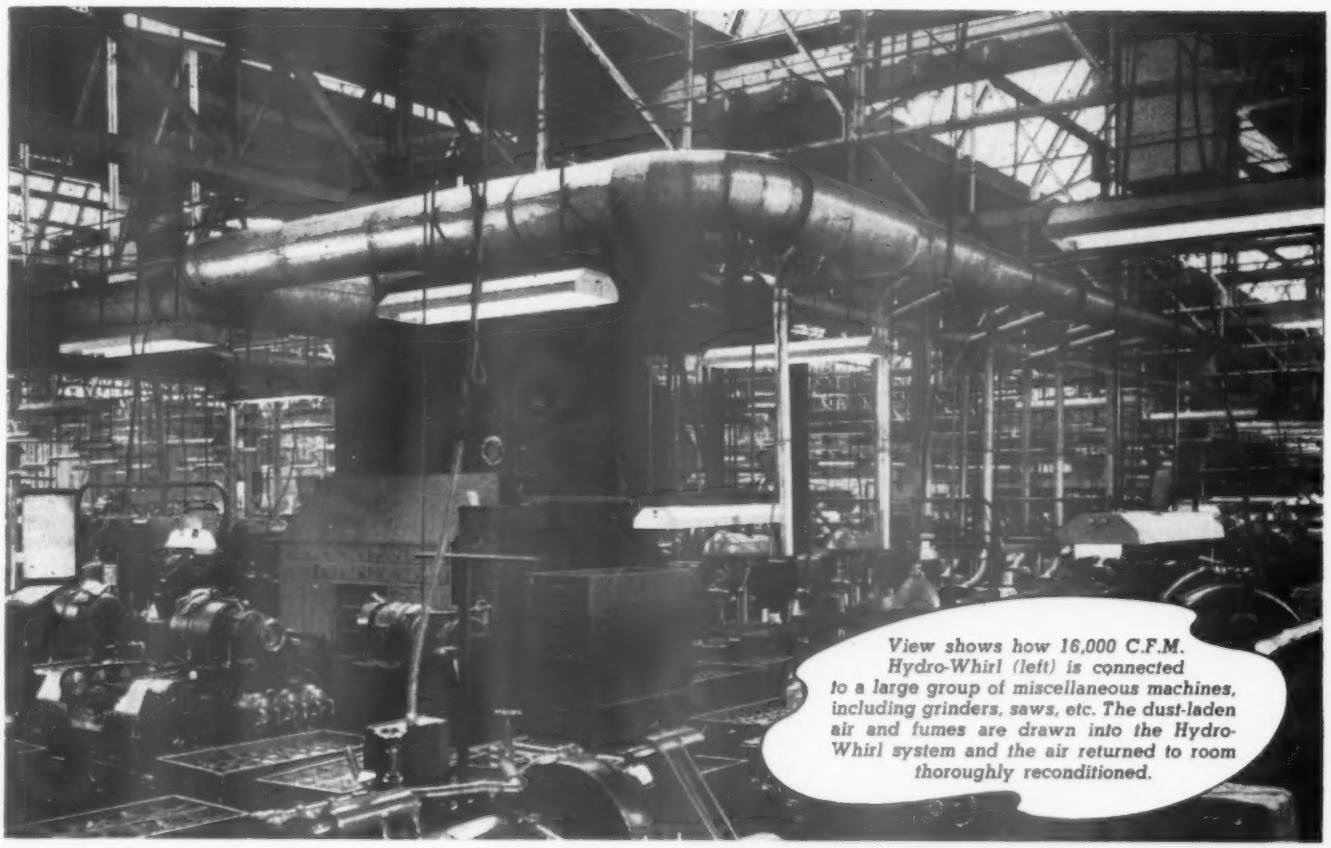
(*Continued on page 266*)


ERIE
"HOOK ON"
A Modern Production Bucket for the Foundry Industry
A widely accepted bucket for intermittent service in combination with a single drum overhead crane which is equipped with a hook block . . . Entirely controlled by the crane operator without extra attendance. Can be hand tripped - - - motor tripped - - - automatically tripped. Designed and constructed to prevent accidental dumping or other hazardous conditions. Built in a variety of models permitting the selection of a particular size, weight and type to insure the utmost performance in any specific application.

ERIE STEEL CONSTRUCTION COMPANY - ERIE, PA.

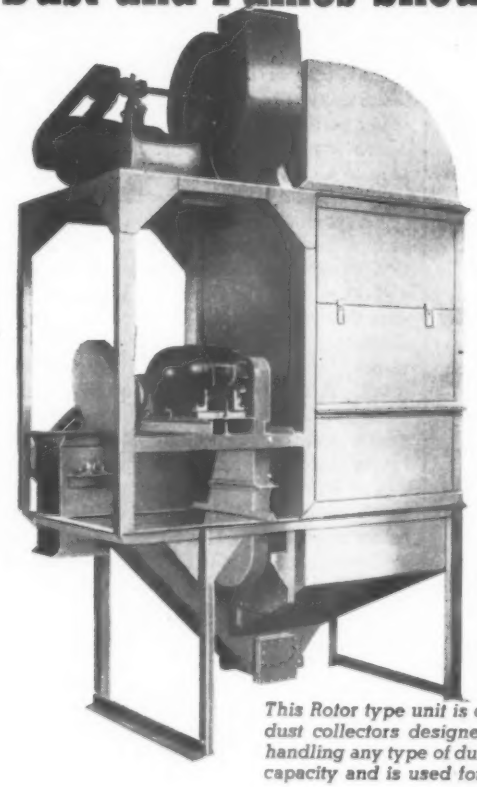
ERIE BUCKETS

10 TYPES TO MEET ANY BUCKET WORK



View shows how 16,000 C.F.M. Hydro-Whirl (left) is connected to a large group of miscellaneous machines, including grinders, saws, etc. The dust-laden air and fumes are drawn into the Hydro-Whirl system and the air returned to room thoroughly reconditioned.

Dust and Fumes Shouldn't Exist in the MODERN FOUNDRY



This Rotor type unit is one of many standard dust collectors designed for general use in handling any type of dust. It is of 4,000 C.F.M. capacity and is used for core sand handling.

Dust and fumes are dangerous enemies in the foundry . . . which sometimes are as deadly as the enemies our boys are fighting today on fronts all over the world. Dust and fume problems can be beaten . . . decisively . . . with the installation of Peters-Dalton engineered air processing systems and Hydro-Whirl dust collecting units and systems.

Peters-Dalton has had long experience with ALL types of problems involving the complete elimination of the hazards of dust and fumes . . . makes a complete and wide range of equipment . . . and knows which can best solve your particular problem . . . to assure top efficiency, trouble-free and economical operation.

Write us today about your particular problem and for informative booklet and information on how Peters-Dalton equipment can help you control foundry dust and fumes.

HYDRO-WHIRL

PETERS-DALTON *Incorporated*

625 EAST FOREST AVE. • DETROIT 1, MICH.

(Formerly Industrial Sheet Metal Works)

MFRS. HYDRO-WHIRL DUST COLLECTORS AND SPRAY BOOTHS—INDUSTRIAL OVENS, MECHANICAL WASHERS AND VENTILATING SYSTEMS

(*Continued from page* 234)

is due to yard conditions, where only large production can justify installation of yard cranes or crawler type cranes.

Due to this condition some foundries may be obliged to continue their present practice of using wheelbarrow and truck to bring scrap, pig iron, and other raw materials to the charging point. However, from that point on, almost any foundry should find it economical to charge the cupola with semimechanical equipment.

Many foundries have found the cupola skip charger economical. This method has the fundamental advantage of eliminating the charging floor entirely, which means the elimination of considerable movement of material. Both the "up and over" type and the bottom discharge are efficient for raising the load.

All set-ups for charging the cupola are different and are not all necessarily solved with the skip charger. Yard conditions, topography, and cupola elevation will influence selection of the most economical method. However, the equipment used should make the cupola charging for foundries requiring up to 6 tons of metal per hour, approximately a two-man job.

It also should be stated here that housing the charging area is desirable. Equipment can be serviced more easily and a certain amount of coke, limestone, scrap and pig iron can be stored under cover, which means not only dry storage but a minimum amount of outside work on the part of cupola operators.

Semimechanical systems for the conditioning of sand, distribution of sand, and the handling of the poured molds to the shakeout area are to many gray iron foundrymen a luxury which is applicable only to high production plants. Analysis of production, present potential business, and anticipated postwar business should be the guide for a foundryman in determining how far he can go in this direction.

It might be pointed out here that the gray iron foundry industry is a basic essential to the present and all future industrial developments. Twelve million tons of gray iron castings should be produced annually to sustain the industrial economy in normal years. However, the demand for the first 5 years of postwar production might be the largest by far in the history of the country.

Consideration should also be given at this time to the probability of a greater proportion of "production items" in this tonnage as new consumer products are designed to take advantage of the savings that modern production and interchangeability of parts will afford.

Advantages Offset Cost

If after careful study of present and future demands for gray iron castings, the foundryman sees need for changes in the plant layout in order to produce more for war and also to be ready to produce for civilian use in the postwar period, cost of the proposed new equipment may be offset by advantages in lower cost and increased production, which are directly or indirectly attributable to a semimechanized system.

The greatest saving in casting cleaning departments will be effected in the proper arrangement of the equipment so that stock cushion areas may be possible and the least amount of backtracking will be necessary. The foundry flow chart will indicate quickly if changes should be made in the existing cleaning room. A study of better handling methods also may indicate labor saving moves which point to the elimination of unnecessary loading and unloading.

Use of modern cleaning machines will bring about important savings in manhours required per ton of castings, due to faster loading and unloading and better and faster cleaning. More thorough cleaning means less re-run castings. Greater capacity per square foot of floor space area will make possible better general cleaning room arrangement.

Improved efficiency and working conditions in the area of the grinding machines sometimes is secured through better arrangement, elimination of line shafting, and the engineering of local lighting for each machine.

An attempt has been made to interest the average foundryman in ways and means of increasing the production of gray iron castings without materially increasing the number of employes. Using

(*Concluded on page* 268)

TELL US YOUR *Specific* NEED

Take advantage of

DEMPSEY FURNACES

DEMPSEY
ENGINEERING SERVICE

If you already have a heat treating problem or if you are thinking in terms of reconversion, write, wire or phone today for the Dempsey "Engineering Survey Sheet" . . . a questionnaire of needs which will put you in line for modern heat treating equipment.

The Dempsey staff of Heat Treating Engineers are highly trained specialists who can serve your immediate needs or assist you NOW in drafting concrete plans for just the type of heat treating equipment you will want for most efficient peace time production.

Out of the crucible of war has emerged a knowledge of new and improved Heat Treating methods. This knowledge is at your disposal for the asking . . . without obligation, of course.

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PRODUCING
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Bethlehem Steel
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Oldsmobile
Reynolds Metals
Sperry Gyroscope
Worthington Pump and Machinery
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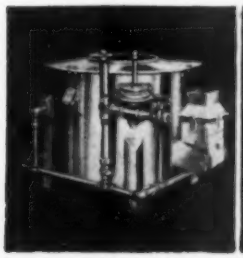
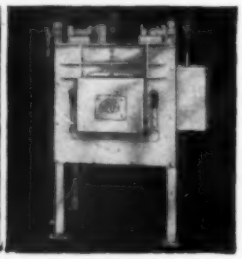
DEMPSEY INDUSTRIAL FURNACE CORP.
SPRINGFIELD, MASS.

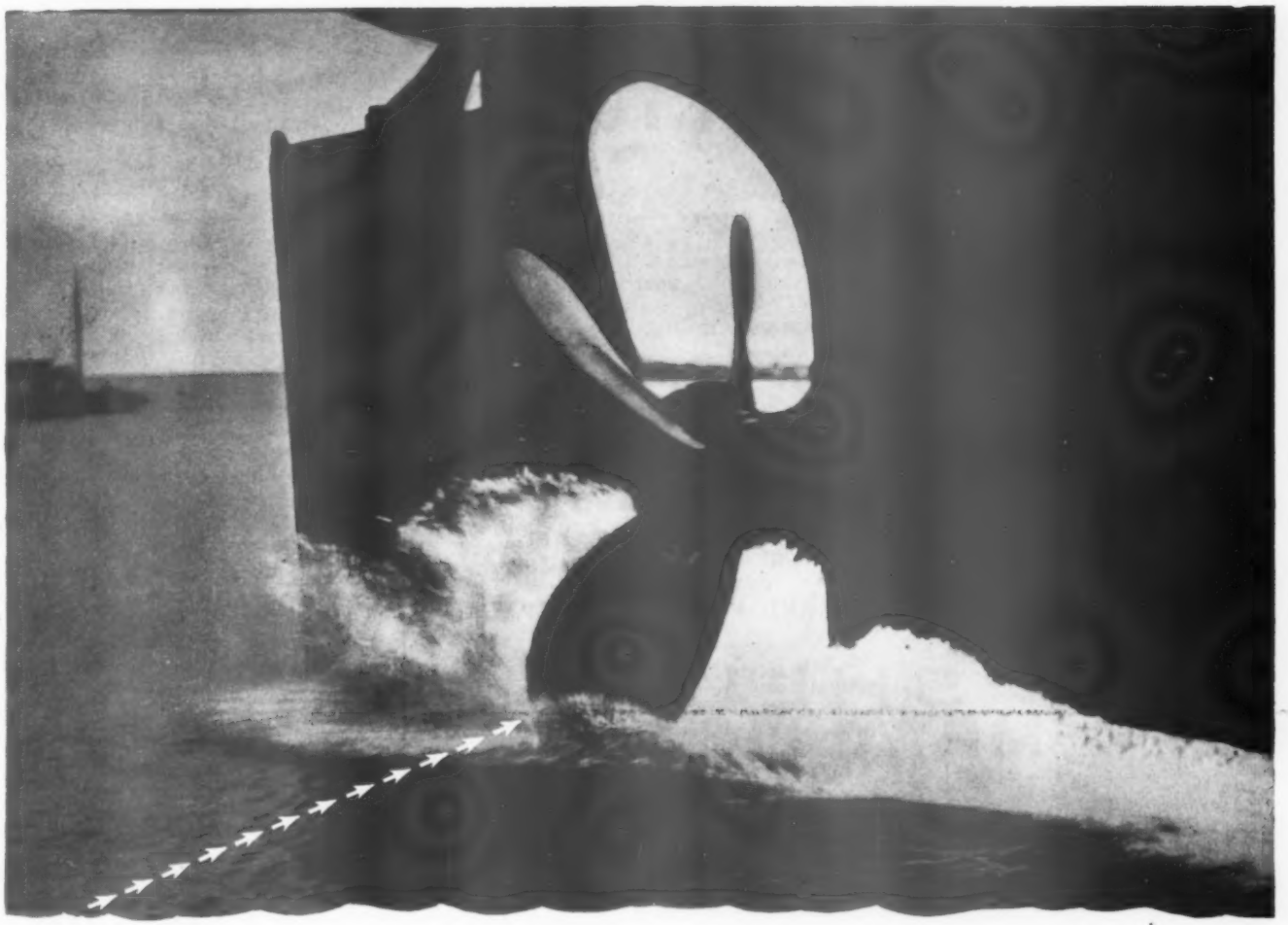
Pot Furnace



Continuous Heat, Quench and Draw Unit

Semi-Muffle Furnace





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CONCO ENGINEERING WORKS
Division of H. D. Conkey & Company 53 Grove St., Mendota, Illinois

(*Concluded from page 266*)

improved working conditions as a spur to increase labor efficiency, better lighting, heating and ventilating, employes' service facilities, concrete floors, and improved buildings are suggested for study.

In the event that a foundryman has become interested in the possibilities of increasing the output of his foundry, a further suggestion is made to approach the problem in a scientific manner. Here, three methods are suggested:

(1) Have the owner or manager, if qualified from an engineering standpoint, take the necessary time to make a thorough study of all the factors reviewed in this discussion.

(2) Appoint a responsible engineer, presently employed, who can be spared to study and analyze the complete problem and make the necessary arrangement drawing and specify the proper equipment.

(3) Commission a firm of foundry engineers who are familiar with foundry surveys and all the latest types of equipment and plant arrangement. This latter method is recommended by the writer.

Most gray iron foundries can be improved in some or all of the categories mentioned. A survey will show, and the results of modernization will prove, that production to a certain extent can be increased with present manpower. A further concomitant result will also show that the cost per pound of good castings will be reduced and the quality of the castings will be improved.

To Hold Management Course in June

A management course devoted to production planning, plant layout, motion and time study, wage incentives and related subjects will be conducted by the University of Iowa, Iowa City, Iowa, June 12 to June 30. The course is intended for plant managers, foremen, industrial engineers, methods and time study analysts, cost accountants and office executives. Tuition and laboratory fee for the three-week course is $150. Registration and communications concerning the course should be sent to Ralph M. Barnes, College of Engineering, University of Iowa.

Pumps To Take Large Casting Tonnage

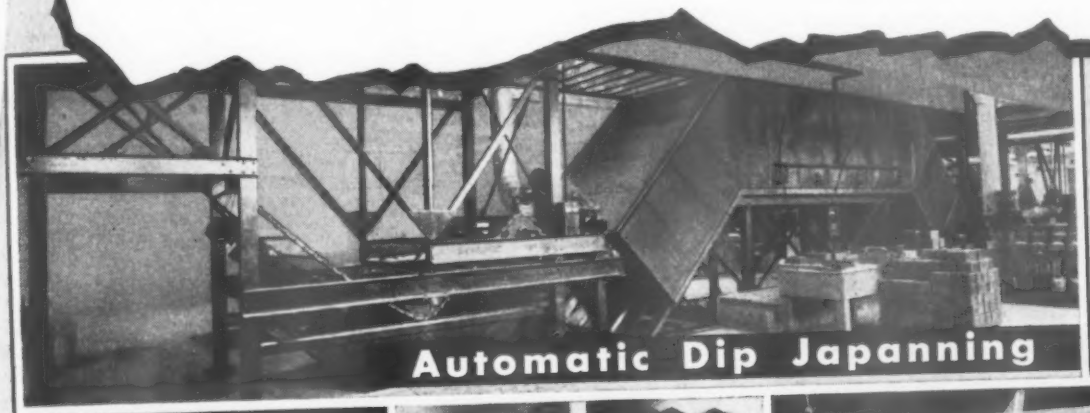
The domestic and farm pumping equipment industry, with a goal of running water in every American home, estimates that it will require approximately 54,000 tons of gray iron castings in the production of farm home water systems in the first full year after victory, an increase of 32 per cent over the 41,000 tons it consumed in 1941, the Gray Iron Founders' Society has been advised.

A Letter of Interest to Prospective Oven Buyers

[The unsolicited letter quoted here was written by a man who is himself an engineer.]

"While I have never been a member of Young Brothers' organization, I have worked with their engineers since 1926. I've seen them tackle a good many tough jobs in that time—jobs which seemed almost impossible at the outset. But they always came through.

"To you men who contemplate an oven installation, especially if it is out of the ordinary, I would definitely recommend that you talk it over with one of Young Brothers' engineers. Their experience (the company has had 40 years of it) may save you a lot of money as well as time."



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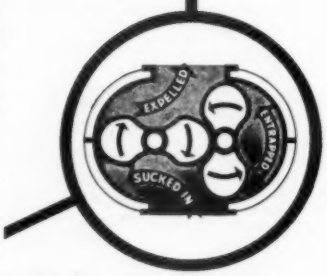
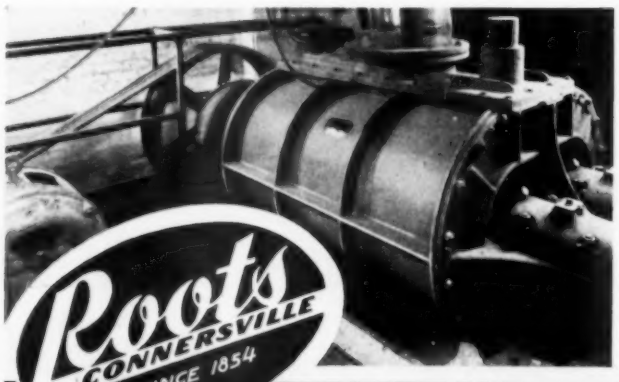
Roots-Connersville Cupola Blower installed in a mid-western foundry. Capacity 2700 c.f.m., 484 r.p.m., 20 oz. pressure.





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CUPOLA BLOWERS

CUPOLA RAW MATERIALS

(*Continued from page* 132)

tensibly the same chemical composition, i.e., within the specification range, but as methods for hardenability testing became more simple and workable, attention was given to the effects of residual alloying elements in scrap. This made results fall still more nearly into line with expectations. On this was built the practical utilization of the residual in the NE steels. Finally, the remarkable effect upon hardenability of a few thousandths of a per cent of boron came to

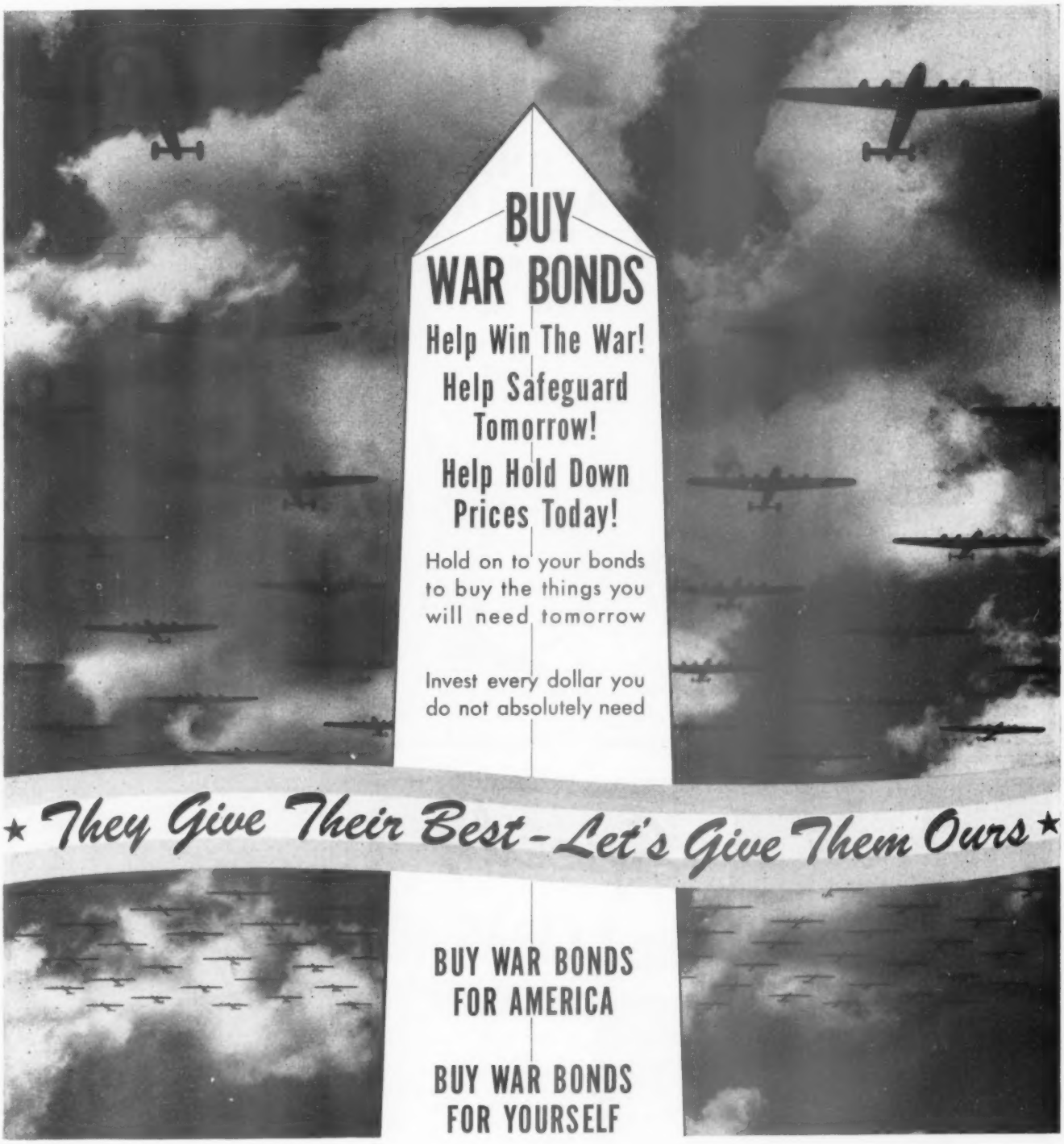
The author, Dr. Gillett, contemplates drawing to an inside straight

light. As a result, hardenability is rapidly coming under control, and the mysteries of "body" are far less mysterious. It is true that in notched-bar impact behavior at low temperature, different heats of steel may still behave in their own individual fashions, yet the broad relation between the methods of working and finishing the heat and the low temperature impact is obvious. Control of those details makes the heredity of the raw materials take a back seat. Erratic behavior in respect to weldability of different heats is slowly becoming related to the true, complete composition.

That is, in steel, the erstwhile mysterious behaviors have been, or clearly will soon be, thoroughly explainable and under control, on the basis of the presence or absence of very small amounts of alloying elements whose effect previously was disregarded, or of non-metallic particles, often in submicroscopic form, but whose presence or absence can be doped out by full knowledge of the chemistry, down to the thousandths of a per cent.

The basic reason why this understanding and control has grown up in the case of steel is that in steel melting the batch is oxidized to a degree that insures elim-

(*Continued on page* 272)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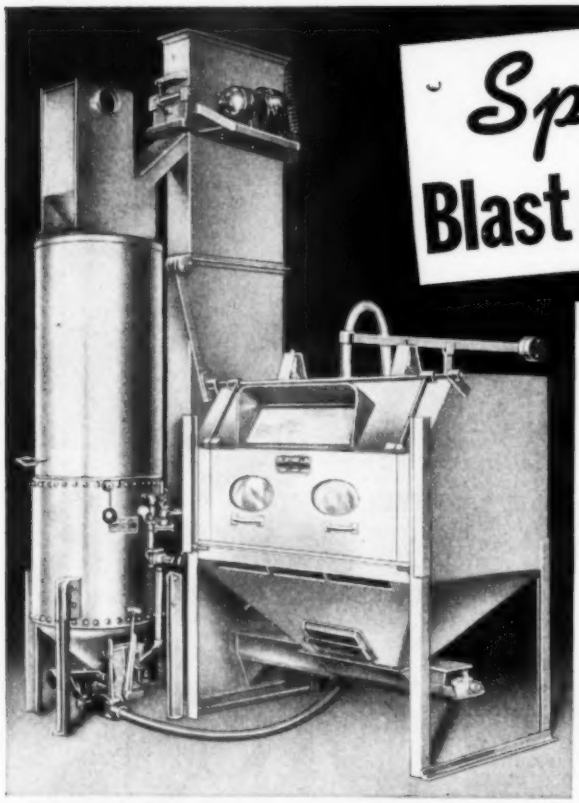

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(Continued from page 270)

ination of oxidizable elements down to a certain, quite reproducible level, and in this process, pre-existing non-metallics are pretty much agglomerated and removed so that variations in pig and scrap are leveled out, save for non-oxidizable elements like copper, nickel and molybdenum, and the effect of these is predictable from their amount, ascertainable by ordinary chemical methods.

In contrast to this oxidizing, wiping-out operation in steel, the cupola has no comparable opportunity to bring differing melts to a steady level. Melting at a high temperature and in the presence of slag may lead to agglomeration and absorption into slag of pre-existent nonmetallic particles, probably giving some degree of leveling, but in insufficient degree.

If in addition, a dose of silicon or of complex alloys containing silicon is put into the ladle, as is generally done when making high test gray iron, some of the variability that would otherwise be met is swamped out. One might guess that this has for its mechanism the partial removal of pre-existent non-metallics by getting the metal hot, and the introduction, by use of the late addition of a more or less controlled amount and type of nonmetallics, essentially silicates.

Study Bath Conditioning

This is not so feasible, or at least not so often applied, in the case of cupola or cupola duplexed malleable. Anyhow, malleable seems to show a much greater degree of heredity than does gray iron.

There would seem to be opportunity for study of the conditioning of the bath for final additions, and of the possibility of wiping up the nonmetallics through the use of slags. The Perrin process of mixing steel and slag and the Yocom process for dephosphorization of steel give hints that something along similar lines might be fruitful for the products of the cupola.

Cupola products do show considerable non-uniformity, some of which results from known and understandable causes affecting composition as to elements normally analyzed for, but some of which arises from causes less well understood and not yet subject to adequate control.

If one heat is melted to the same temperature as another and both melts truly have the same composition in every way, they ought to act alike. The writer will personally go further, and say that they *will* act alike. However, different heats of cast iron whose analyses are identical, as far as our analytical methods reveal, show differences in chilling tendencies, amount of combined carbon, graphite size and distribution, presence of free ferrite, response to superheating, and in resultant strength, wear resistance and machinability. If some of the silicon is reserved for a late addition, the behavior differs from the case where it is all in the melt. Different means of providing the late silicon addition produce different

(Continued on page 274)

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Many foundry men call SUPER TAMASTONE indispensable for match plates, squeezer plates, cope and drag patterns and pattern duplicates.

See how you yourself can now increase production as much as 400%. Cutting costs 75%. Get complete details, information, literature. Send coupon today. It will bring you added profits.

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Rush me literature, complete details, telling me how I too can increase production up to 400% with SUPER TAMASTONE.

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(*Continued from page* 272)

results. The effect of the late addition tends to "wear off" with lapse of time between the addition to the melt and the freezing of the metal.

Different charges and different methods of melting produce different results. A.F.A. *Transactions* for the past few years are replete with examples, so many that it will not be necessary to cite the literature. It will be recalled that the mixing of two cupola melts, one high- and one low-carbon, gives different results from a single melt of the composition of the blended iron; that an all-pig melt is more open and weaker than one with 20 per cent steel, though the final analysis is the same; that in duplexing malleable, the iron mottles if the doors of the electric holding furnace are closed; that pig from one particular high phosphorous ore is said to behave in a fashion not explainable by composition and so on. Despite all the observed facts, the reasons for this much-discussed "heredity" of pig iron—differences that persist after remelting and affect the type and distribution of graphite in the cast iron—remain obscure.

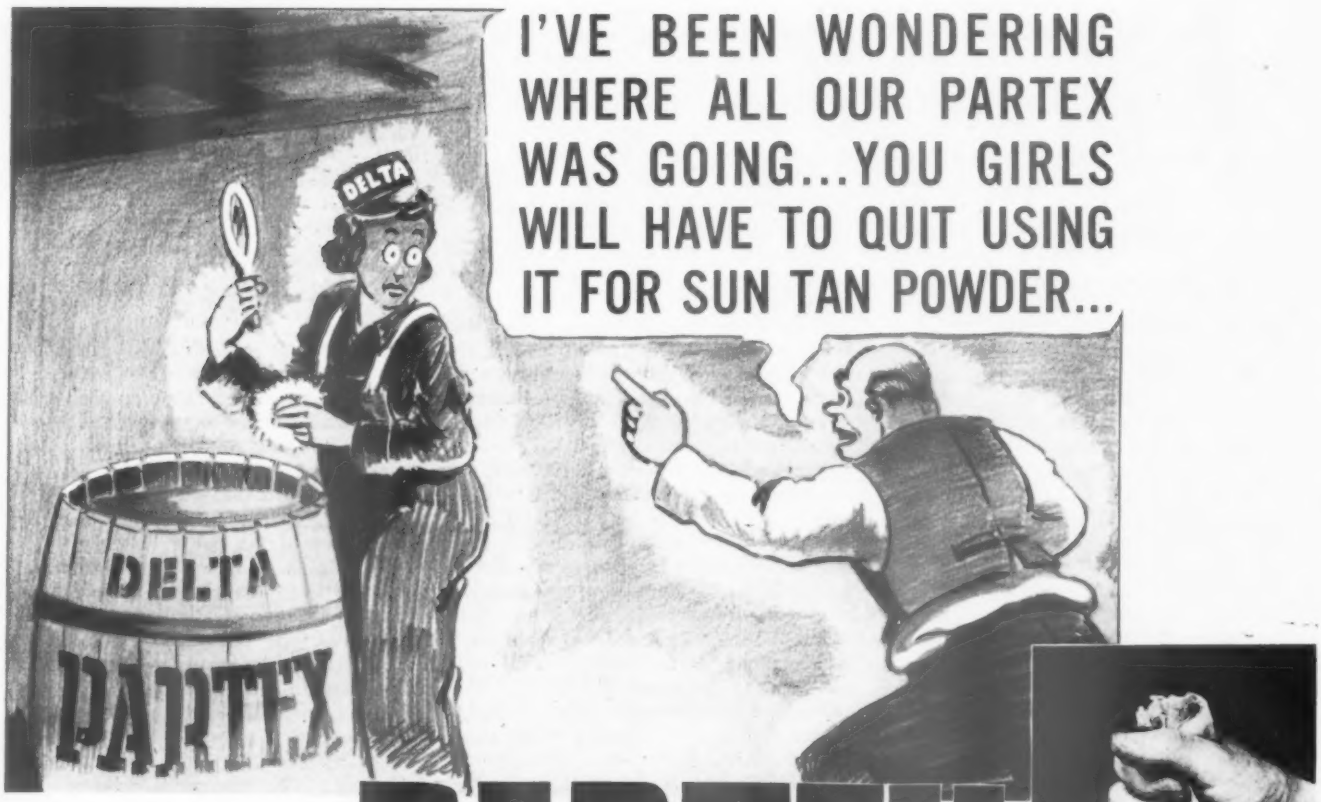
Read any one article and it will be found that the author has a hypothesis to fit some of the facts, but in discussion, someone is sure to bring up equally well-established facts that do not fit that hypothesis.

Experts Differ

From the fact that a trace of graphite, added to the cooling metal just before it freezes, inoculates the metal so that the position of primary graphite is hastened and chill depth reduced, Massari and Lindsay concluded, in 1941, that Piwowarsky's hypothesis of undissolved graphite nuclei is still tenable though Piwowarsky himself and Norbury, once an adherent of the hypothesis, have both recanted on the basis of later experimental evidence. Bolton makes pertinent comment in discussion of Massari and Lindsay's paper on the unproven assumption that the finding of graphite in the chilled shot necessarily represents existence of graphite in the melt. That extremely tiny graphite particles torn off from a solid chunk of graphite electrode remain undissolved while the chunk itself is dissolving seems a bit fantastic.

Eash, whose appraisal is concurred in by Flinn and Reese, gets around this in another way, concluding that late silicon additions produce localized silicon concentrations high enough to cause kish separation and that these graphite particles then inoculate. It is regrettable that Eash did not try stirring during inoculation to remove the alleged concentration and see what happened then. Discussers of this paper found it hard to believe that silicon concentration can exist to the degree postulated, or to explain, on that basis, why calcium-silicon and other complex addition agents are more potent than ferrosilicon. Eash hedges by saying "The nuclei could be graphite and perhaps other inclusions

(*Continued on page* 276)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DELTA PARTEX (Nut Shell Parting) is the modern, scientific Lycopodium replacement. It is a superfine powder which flows like water. It dusts freely through the shaker bag and will not pile up in corners.

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(*Continued from page* 274)

that separated from the melt at the proper time."

The fading of inoculation effects, ascribed by Eash and others to slow solution of graphite nuclei, raises the question how a pig iron can supply graphite nuclei so resistant to solution at high melting temperature that the pig can show heredity. If kish is the answer, then the heredity of any pig should be destroyed by a sufficiently high melting temperature. Inoculation seems to affect *primary* graphite only.

The heredity that results in finely divided graphite resulting from decomposition of carbide seems to be related to an absence of inoculating effect, i.e., to supercooling that prevents separation of primary graphite, and whose graphite all results from decomposition of cementite. The British investigators, Norbury and Morgan, relate such heredity behavior to the inclusions being plastic as the metal freezes, and offer interesting experimental evidence by addition of titanium, bubbling of CO_2 to oxidize titanium, or of hydrogen to reduce the titanium oxide and destroy the postulated action which that oxide might have on other silicates and oxides.

However, in metallographic studies on this point, Morrough finds titanium present only as carbide, cyanonitride and in complex sulphides, and states that oxides and silicates are virtually nonexistent in cast iron from the metallographic point of view. If they are present, they are submicroscopic and not resolved, he says. Yet in this country, we have Schuh reporting silica and alumina associated with kish freed from hypereutectic irons, and also in the metal itself, and Ziegler remarking that nonmetallic inclusions are found, not only with graphite flakes in gray iron, but along with temper carbon in malleable. Moreover, vacuum fusion analyses indicate that a little oxygen, even though it seems to be very little, may be present in cast iron. That the amount would be low is expected from the high carbon. But experience with boron in steel tells us that percentages do not always have to be high for a constituent to exert an effect. If there is any oxygen present at all, it must be combined with something, and it is logical to expect it to be combined with elements, more readily oxidizable than iron, and probably to exist as silicates.

Von Keil's assumption of a submicroscopic silicate slime of such a fine state of subdivision that it remains suspended, which slime, as the metal cools, seeds out primary graphite, is, so far, neither proved nor disproved. The behavior of metal that acts as though it contained such slime is different when remelted under acid and under basic slags, as was brought out in Von Keil's later work and by other German work. The refining action of sodium carbonate treatment is in line with this.

However, the removal of sulphur accomplished by sodium carbonate or a basic slag is an additional factor to any removal of silicates. Bolton has commented on the possibility of sulphides affecting graphite formation, and Boyles finds that graphite distribution is a complex function of manganese, sulphur, and hydrogen. Boyles produced quite definite evidence that hydrogen stabilizes carbide. Some of the results of Norbury, otherwise hard to explain, become logical on the basis of presence, or absence, of hydrogen.

Remelting of irons that show excessive chill sometimes again gives excessive chill, whereas other observers find that the chilling tendency does not survive remelting, a situation that could result from retention of hydrogen in the one case, its loss in the other.

Boegehold, it will be remembered, inclined toward the belief that pig made in blast furnaces operating with high humidity blast, and melted in cupolas likewise having high blast humidity, had excessive carbide stability and tended to retain it. When moisture is present in the blast, it dissociates into hydrogen and oxygen. The main probable source of hydrogen is moisture in the blast, a secondary one is hydrous rust on scrap charged. The nascent hydrogen produced by decomposition of water vapor is probably much more active than molecular hydrogen bubbled through the melt. Humidity-controlled blast furnaces are now in operation. The behavior of foundry pig made in such operation as to heredity should be looked into and compared with that from uncontrolled furnaces. Humidity control of the cupola blast is also under commercial trial.

Composition and Humidity

Eash and Smith, reporting in 1941 on laboratory runs of a humidity controlled cupola, concluded that lower carbon, manganese and silicon were produced with higher humidities, and the structure of the low carbon iron used varied in accordance with the composition and that only. Yet Boegehold's 1929 evidence cannot be disregarded. He knew something about the effect of chemical composition, and when he concludes that there is an effect beyond that cause, he stands a good chance of being right, even though he drew these conclusions 15 years ago.

Carefully conducted experiments, done in 1929, and other carefully conducted experiments done in 1941, deserve equal credence. Experiments are always right. Inanimate objects are perfectly honest, they do just what they ought to do under the conditions imposed. It's our failure to know just what every condition was, and our human limitations in interpretation of experiments that get us all mixed up.

Since humidity may play a part, let's consider humidity. To melt a short ton of cast iron, we need somewhere around 2400 pounds of air, 200 pounds of coke and a few pounds of flux. Along with the 480 pounds oxygen in the air, comes

(*Concluded on page* 278)

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You save two ways with Reading unit crane design... lower first cost and lower maintenance cost. The flexibility of unit design enables Reading to engineer a crane tailored exactly to your needs, without any special engineering or design costs. Interchangeable mounting dimensions and gear ratios give a flexibility to meet changes in conditions after installation with a minimum of expense.

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That's why the U. S. Treasury asks Management and Labor to sit down together and organize—NOW!

For organization—good organization—has been responsible for the excellent showing of the payroll market. And its most important single superiority has been personal solicitation—desk to desk, bench to bench, machine to machine personal solicitation. 71% of all persons on payroll deductions were solicited for the 4th War Loan.

Now, to personal solicitation, add the sales incentive of a definitely established plant quota. Build your campaign around a quota plan. Set up departmental goals. Stress percentage of participation figures. Stimulate group enthusiasm.

In planning your quota campaign, work in close cooperation with the Chairman of your War Finance Committee. Everything is set to make the 5th War Loan drive a huge success—with your help!

(Note: You've read this message. If it doesn't apply to you please see that it reaches the *one* person who can put it in action!)

Here's the Quota Plan:

1. Plant quotas are to be established on the basis of an *average* $100 *cash* (not maturity value) purchase per employee.
2. Regular Payroll Savings deductions made during the drive accounting period will be credited toward the plant quota.
3. 90% of the employees are expected to contribute toward raising the cash quota by buying extra 5th War Loan Bonds: 1—Outright by cash. 2—By extra installment deductions. 3—By extra installment deductions plus cash.

Example: **JOHN DOE Mfg. Co.** — 1,000 Employees

1,000 employees x $100 Regular Payroll deductions during the eight weekly payroll Accounting Periods of June and July = $100,000 Cash Quota

30,000
$70,000 (to be raised by sales of extra Bonds to at least 900 employees)

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NEWS

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American-Heanium Long Lyfe Nozzles will give you more uniform results, at greatly lowered cost. Inside the alloy steel jacket is a hard, abrasion-resistant ceramic insert that gives top performance over long hours of use.

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The "cheapness" of ordinary iron nozzles is illusory, while the high prices of others are definitely out of line when compared with A-H Long Lyfe Nozzles costing only $8.00 to $10.00.

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It is the low cost per hour of uniform efficiency that makes A-H Long Lyfe Nozzles the logical buy today.

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You save in other important ways, too: reduced labor and blasting time — reduced air consumption — reduced cleaning costs.

Write for Bulletin 17.

American Foundry Equipment Co.

505 S. Byrkit St., Mishawaka, Indiana

AMERICAN HEANIUM
LONG LYFE
NOZZLES

(*Concluded from page 276*)

1920 pounds of nitrogen. If our pig or scrap contains traces of titanium or other nitride-forming elements, we might look to nitrogen as one source of nonmetallics. However, the feature that differentiates one day's air from another is the moisture content.

The 2400 pounds of air is 30,000 cubic feet at 40 degrees Fahr., and this cold air, at 100 per cent humidity, carries about 12 pounds of water, which provides about 1 1/3 pounds of hydrogen. At 90 degrees Fahr. and 100 per cent humidity, we must blow in 35,000 cubic feet of air to supply 2400 pounds, and it carries some 73+ pounds of water, i.e., 8+ pounds of hydrogen.

Automatic devices can be had to compensate for temperature and barometric pressure, so that the weight of air and oxygen remains constant. But the variable amount of water vapor is controlled only by the weather, unless we follow Mark Twain's advice and do something about it. The output of the cupola's big brother, the blast furnace, now is recognized to be bettered by dehumidifying the air, but it does not follow that on mere economics of production, it will be advantageous for the cupola. The effect on uniformity and quality of the product is really the more pertinent question.

May Explain Heredity

It is quite obvious that moisture and hydrogen are not so fatal that the last trace must be removed, and, indeed, it might be quite as much in order to humidify winter air back to a standard level as to dehumidify damp summer air down to it. It is feasible to control the humidity of cupola air, and commercial installations, now in fairly long service, ought to show what effect on quality and uniformity is obtained by a humidity control.

At any rate, when we attempt to chase down the effect of other variables, use of a humidity-controlled cupola will be advantageous, for it is quite possible that some of the other raw materials, notably pig and coke, may show up their differences only in conjunction with some particular level of humidity. Tests at controlled low and high humidity should be the rule in seeking to explain "heredity."

It is also possible to supply air to the cupola with some reasonable degree of superheat, using the top gas for preheating. With a continuously operated cupola, rather elaborate means can be applied and considerable superheat provided, as Vial does, or, for non-continuous operation the simple scheme of MacKenzie and a lower superheat can be used. While superheat is primarily for coke economy and cupola output, nevertheless it might happen that cokes would behave differently on burning with cold or hot air. At least, the zones within the cupola must be somewhat altered.

Coke is certainly one of the variable raw materials of the cupola. We may pass by beehive coke as a thing of the past in normal times and consider only byproduct coke, which is made under some sort of control, yet naturally must vary, because the woods from which nature made the coals varied in resin content, and the resultant coals vary in coking behavior. The ash content is highly variable and the sulphur content varies. Some high ash content coals are washed to free them from part of their ash content, and various types of coals are blended to control the coking behavior. Coke is not merely fixed carbon plus ash, it still has a little oxygen and nitrogen in it, and the chemical composition and combination may vary. Coke varies, with the types of coal and the time and temperature of coking, in physical structure, especially in porosity and ratio of surface to volume. The ash may be uniformly disseminated or may be present in patchy distribution.

(*To be concluded*)

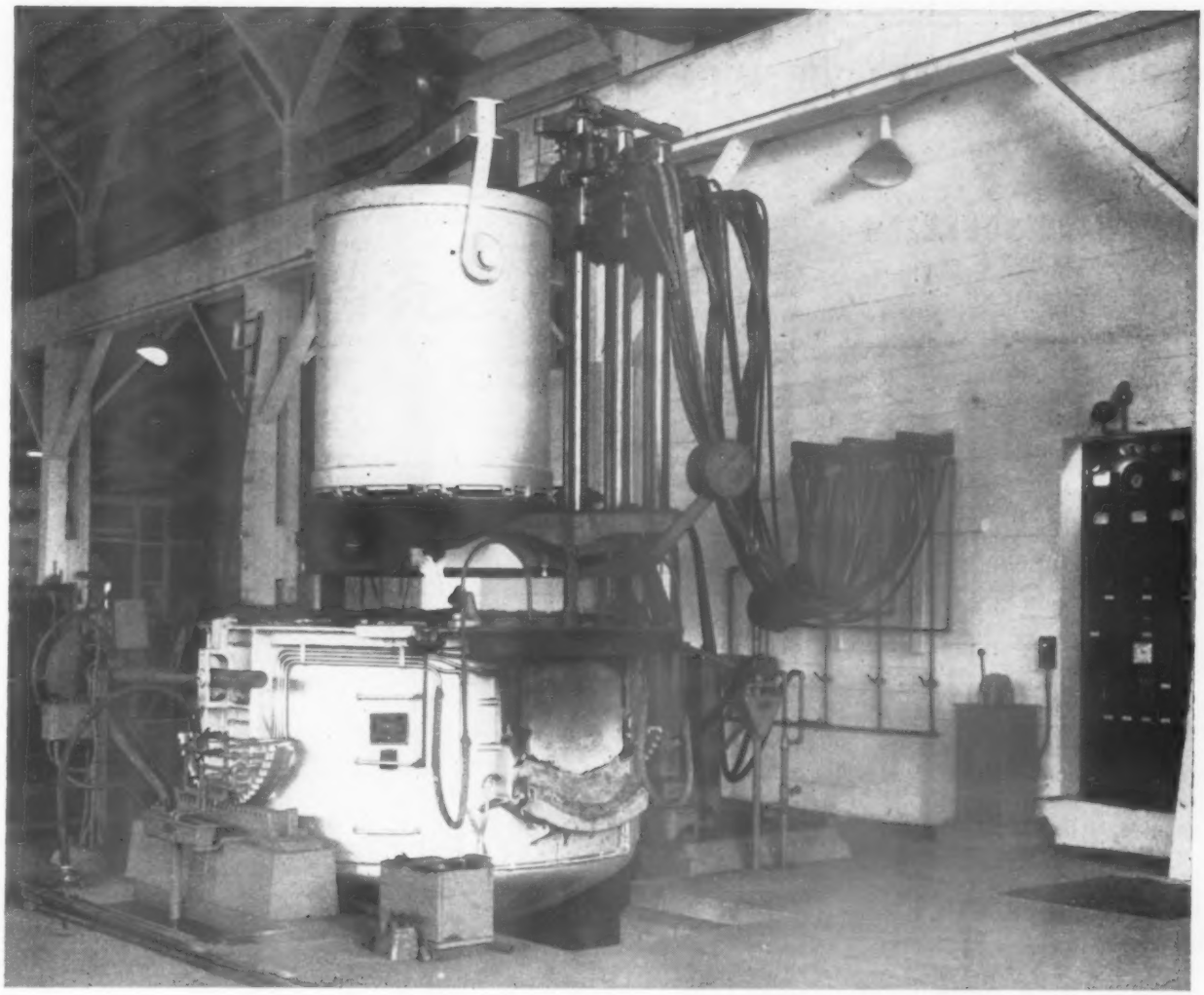
Magnesium Interests Form Association

To foster the development of fabrication techniques for magnesium alloys, producers and fabricators of the metal have formed a new organization known as the Magnesium Association. One of the purposes of the group will be to give members and the public authentic information as to the properties and advantages of magnesium alloys, as well as to the suitable types of applications. Temporary offices of the association are at 2537 West Taylor street, Chicago 12.

Edward S. Christiansen, vice president, Apex Smelting Co., Chicago, was elected president of the association at an organizational meeting held at Chicago. C. C. Loomis, president, New England Lime Co., was elected vice president, and C. E. Larson, operations manager, White Metal Rolling & Stamping Co., was elected treasurer.

The board of directors includes: Mr. Christiansen; E. A. Canning, Allison Division, General Motors Corp.; W. H. Osborne, Acme Aluminum Foundry Co.; F. O. Case, Basic Magnesium Inc.; W. G. Brown, Bohn Aluminum & Brass Corp.; C. J. Amick, Century Metalcraft Corp.; C. A. Brantingham, Ebaloy Foundries Inc.; A. Cristello, Eclipse-Pioneer Division, Bendix Aviation Corp.; R. D. Taylor, Federated Metals Division, American Smelting & Refining Co.; D. W. Moll, Hills-McCanna Co.; D. A. Merson, Magnesium Reduction Co.; P. J. Watry, Metal-Mold Magnesium Corp.; B. Sandell, Stewart Die Casting Co.; F. S. Wellman, Wellman Bronze & Aluminum Co., and Mr. Larson.

Membership of the association is representative of all phases of the magnesium industry. Four major groups are represented: Producers and smelters of ingot; sand, permanent mold and die casters; wrought products; and magnesium powder manufacturers. A Sand Casting Division was formed at a meeting of the association Feb. 9, with Dan W. Moll, Hills-McCanna Co., as chairman of the group.



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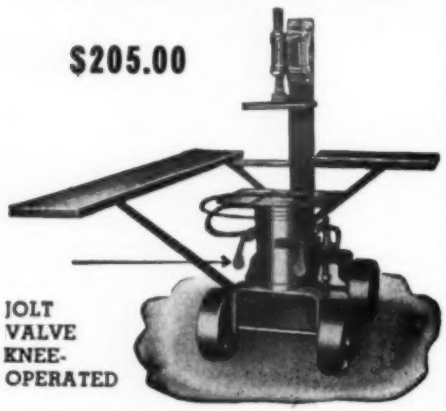

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MILWAUKEE (West Allis) WISC.

MELTS 100 TONS OF BRONZE DAILY

(*Continued from page* 129)

busy on a wide range of small miscellaneous castings involving an almost continual change of patterns. Benches are arranged in pairs, back to back. The finished molds are set up for pouring on a double row of low stands in the open central spaces. Only a comparatively small quantity of sand is required. It is used repeatedly and since the castings are light and are shaken out soon after they are poured, the sand seldom becomes too hot to use. Sand from the Albany district in New York in two grades, fine and medium, is used for making the molds and to a limited extent also is incorporated in some of the core sand mixtures.

Fine sand is used on the majority of the floors. Use of medium grade sand

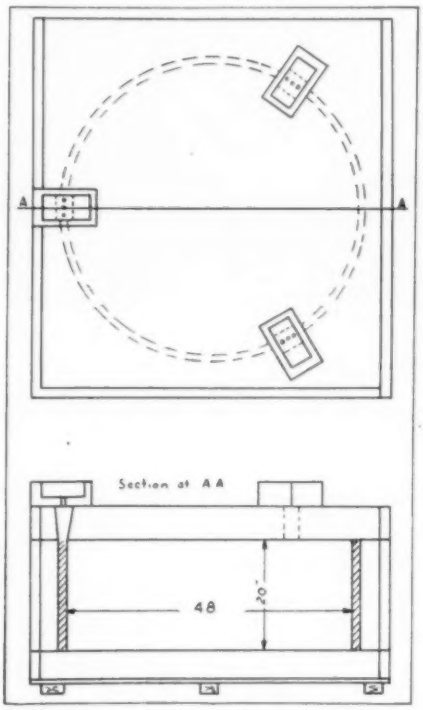


Fig. 9—Plan and sectional view of gating arrangement. Not drawn to scale

is confined principally to the heavy jobbing floors at the south end of the foundry where large bushings, mill bearings and other heavy and miscellaneous castings are made according to the methods prevalent in any up to date nonferrous jobbing foundry. At present most of these castings form integral parts of machinery connected with the war effort.

Method of molding and pouring a bronze ring 48 inches outside diameter, 45 inches inside diameter and 20 inches in height is shown in the accompanying illustrations Figs. 1, 2, 3 and 9. The mold is made in a three-part wood flask, drag, cheek and cope. The drag is set up on the level floor, filled with sand, rammed and then struck off flush with the joint to form a seat for the pattern. With the pattern centered in place and with the cheek flask resting on the drag, sand is rammed in the space inside and outside the pattern up to the top. The facing sand next to the pattern contains a small amount of artificial binder since the face of the mold is to be skin dried before the mold is closed. A flush parting is made at the top and then the cope is rammed in the usual manner. The gating system shown in Fig. 9 was developed by the foundry superintendent, and since it has proved highly satisfactory it is worthy of comment. Three riser blocks, 3 x 5 inches at the top and 1½ x 4 inches at the bottom, are set up at three equi-distant points on top of the pattern. Openings left in the cope by these blocks form passages for the entrance of the metal, and later serve as risers or feeders.

Blacked and Dried

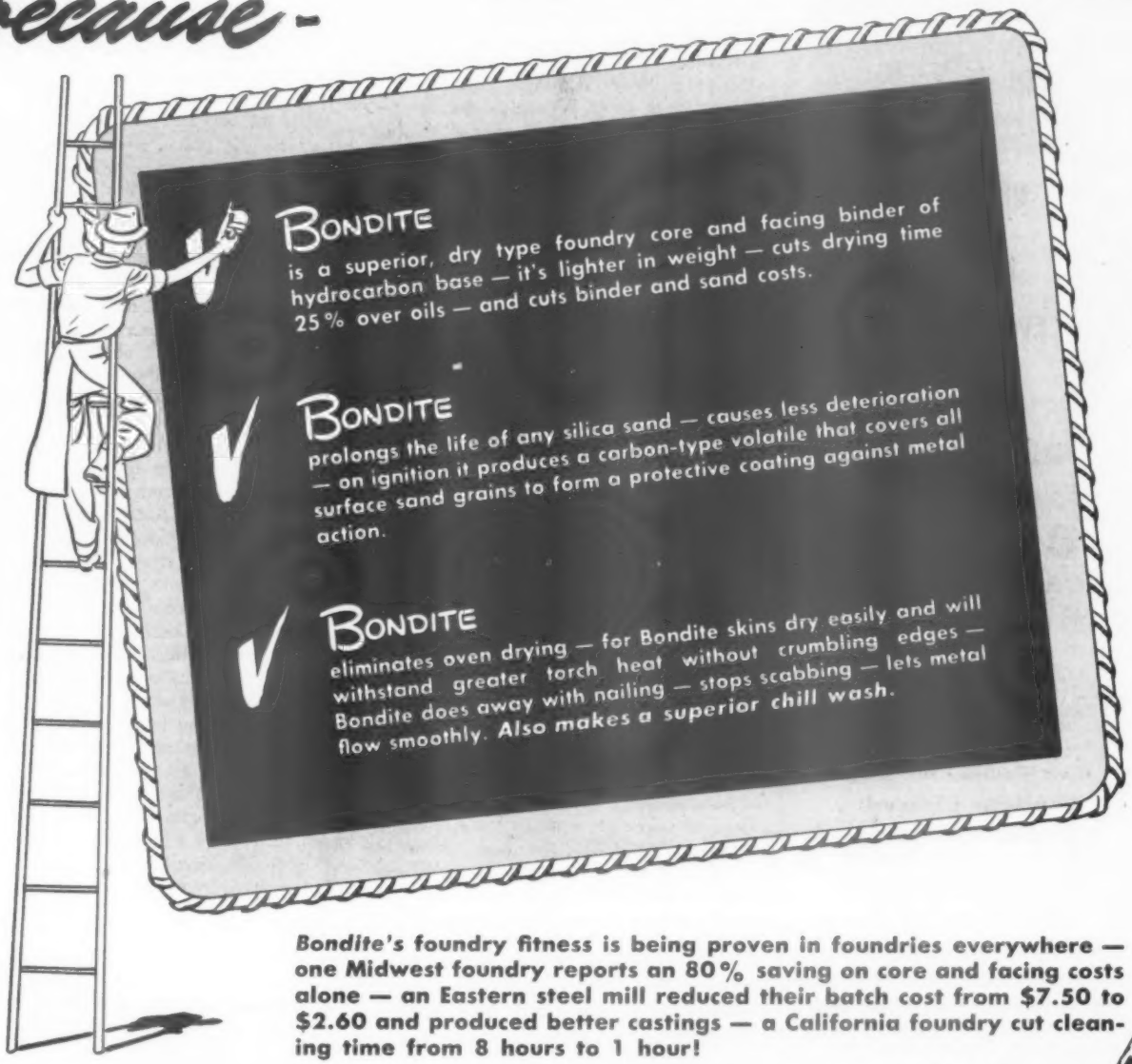
After the cope has been lifted off, the pattern is removed and then the cheek is lifted off and set up on a pair of wooden horses, as shown in Figs. 2 and 3. The face of the mold inside and outside is painted with a solution of plumbago in molasses water and then dried with an oil torch to a depth of approximately 1-inch. The mold then is reassembled. A core sand runner basin baked in the oven is placed over each of the riser openings. Metal poured into a depression near the outer end of the basin flows forward and then drops through a number of small holes into the riser openings in the cope, and thence into the mold cavity. This feature is illustrated in Fig. 9. Metal is poured simultaneously from three crucibles with the object of filling the mold rapidly and maintaining a practically uniform temperature in all parts of the casting. The method seems to be ideal from both the theoretical and practical standpoints. Progressive solidification starts at the bottom with the first metal to enter the mold, and gradually travels upward to the top where the hottest metal is present in the risers. Experience also indicates that a strong flask and firmly rammed sand are essential factors in the prevention of shrinkage defects. Where the sand or flask yields under pressure when the mold is filled with metal, the metal on the top will sink, and the defect is wrongly attributed to shrinkage.

Shrinkage is not a serious problem in this foundry on account of the character of the metal. Risers and feeding heads are employed to a limited extent, but the great bulk of the castings require no feeders. Heavy bushings, cored or solid, are poured under high heads. It is claimed that the pressure exerted insures solid metal in the casting. The pouring heads are cut from pieces of 5-inch diameter steel pipe and lined with sand. They range in height from 6 to 8 inches.

The heavy jobbing section at the extreme south end of the foundry is

(*Concluded on page* 282)

Mr. Foundryman — for faster production of smoother, better castings use BONDITE *because —*



BONDITE is a superior, dry type foundry core and facing binder of hydrocarbon base — it's lighter in weight — cuts drying time 25% over oils — and cuts binder and sand costs.

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Truline Binder
The Smith Facing & Supply Co.
1857 Carter Rd., Cleveland, Ohio

(*Concluded from page* 280)

equipped with several jib cranes located at strategic points, also a 2-ton electric traveling crane which embraces the entire section.

At present the majority of the castings made in this foundry are destined for equipment employed by the armed forces on land, at sea and in the air. Some day a description of the scientific and practical methods, equipment and processes developed in shop and laboratory to successfully meet exacting specifications will constitute a highly interesting story. At the moment, for obvious reasons, details are not available for publication. However, reference may be made to at least two lines of castings, railroad car and locomotive bearings and electric railway bearings and trolley wheels, that have been made continuously and in large volume ever since the company first began operation in 1874. The extensive department where the bearings are machined and lined with babbitt metal is worthy of a story in itself, but lies outside the scope of the present discussion confined to the foundry.

Several floors are equipped with the production of journal bearings. The patterns are mounted in pairs on heavy plates, one pair for the drag mounted on a jolt-squeeze machine, and a corresponding pair for the cope mounted on a jolt-squeeze, stripping plate machine. The concave or working face of the bearing is molded in the drag. A single sprue near one end of the cope delivers metal to two short branch gates, one leading to each mold cavity. Molds are set up on conveyors for convenience in pouring. Melting and pouring routine is so arranged that a batch of molds is poured before the conveyors are fully loaded. The castings are shaken out almost immediately and loaded directly into containers for movement to cleaning department by power lift trucks. Sand is wet down and cut over by hand toward the back of the floor where it is passed through a power operated rotary type riddle. Molds are made in steel flasks.

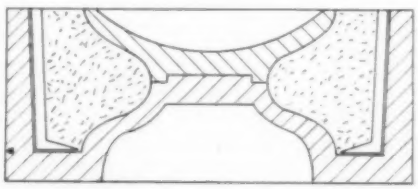

Fig. 10—Sectional view of corebox equipment for making trolley wheel green sand cores

Grooved trolley wheels for electric street cars and similar service are made two in a snap flask by a molder and helper on a squeeze type machine. Plain block patterns form the mold. The green sand core for forming the groove in the rim is made in a metal corebox mounted on a stand close to the molding machine. The helper makes the cores in addition to his other duties, placing molds on the pouring stands, shifting weights, shaking out castings and cutting over the sand.

The metal corebox is in two parts, the lower part solid and containing a duplicate of the lower part of a trolley wheel attached to it permanently. The upper part corresponding to the second half of the wheel is loose and is fitted to the lower half by a male and female joint. An attachment in the center locks the halves together. A light metal ring with an angle cross section and conforming on the outside to the shape of the core print on the pattern is employed for carrying the core. The back wall of the ring is slightly tapered to drop easily and accurately into the core print in the mold. A sectional view of corebox and lifting ring is shown in Fig. 10.

With the top half of the corebox and lifting ring in place, the operator packs sand in the open space with his fingers. He scrapes the top off flush and then removes the upper and inside part of the corebox. He then catches the lifting ring at two opposite points and lifts the core out of the box and sets it on a bench. He keeps a number ahead of the molder's requirements.

Plans for extensive changes designed to increase materially the capacity of the foundry practically were completed at the time this was written and the rejuvenated plant probably will be in operation by the time this description is published. Sand from a central double unit preparation station will be distributed by belt to a long line of hoppers erected over a battery of molding machines. Molds from the machines will travel on roller conveyors in the general direction of the furnace room. After they are poured they will be pushed off the conveyor lines on to a transfer car which will deliver them to other parallel conveyors running in the opposite direction. Here a second transfer car will deliver them to the shakeout where the castings will be loaded into tote boxes and carried by gasoline lift truck to the cleaning room. From the shakeout location the flasks will be returned by another conveyor to the vicinity of the molding machines. The sand from shakeout will be delivered on to a belt below the floor level, from where it will be lifted by an elevator and discharged into storage bins. From the storage bins the sand will be delivered in measured batches in a larry car and discharged into one of two mullers and then delivered by elevator through an aerator to an overhead belt which will carry the prepared sand to the long main belt feeding the hoppers over the molding machines.

Acquires Kron Co.

Yale & Towne Mfg. Co. has purchased the scale business of the Kron Co., Bridgeport, Conn., which hereafter will be under the general direction of Yale & Towne's Philadelphia Division.

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If you want to broaden your knowledge of the foundry industry the following informative and instructive books will prove most helpful. Select the ones you need at once—use the convenient order form below.

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Melting Iron in the Cupola *Price,* $2.00

The author, J. E. Hurst, covers cupola construction, operation and maintenance in a very usable manner.

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NEW TRADE PUBLICATIONS

CHAIN BELTS—A new bulletin describing its chain belts for drive and conveyor service in various industries has been issued by Chain Belt Co., 1671 West Bruce Street, Milwaukee 4. Different types of belts available and typical applications are illustrated, together with a discussion of properties of the company's REX Z-Metal of which the belt parts are made.

AIR PROCESSING—"Air Processing Equipment" is the title of a new 56-page catalog released by Peters-Dalton Inc., 628 East Forest avenue, Detroit 1. It shows numerous installations of dust collecting units and systems, spray booths and equipment, ovens, etc. It also includes detailed specifications of dust collectors and spray booth units together with engineering data of value to those with air handling problems.

POLISHING, BUFFING—A 36-page catalog which provides detailed information on materials, equipment and operating practice in polishing, buffing and deburring has been published by Frederic B. Stevens Inc., 510 Third street, Detroit 26. It contains valuable suggestions for not only the operator, foreman and superintendent, but also for the plater, chemist and engineer.

ALUMINUM ALLOYS—A 16-page booklet issued by the National Smelting Co., 6706 Grant avenue, Cleveland 5, gives a concise but comprehensive description of the company's Red-X aluminum alloys. Included are its method of production, properties and applications.

SAND CONTROL—A 64-page, illustrated bulletin published by the National Engineering Co., 549 West Washington Boulevard, Chicago 6, covers the subject of sand preparation and control in an authoritative and comprehensive manner. The text treats in detail the proper preparation of sands in the various types of foundries, and describes the company's mixers for mulling of sand.

ARC WELDING—A handbook of engineering data, welding procedures and heat treatment procedures for tool and die steels has been published by C. E. Phillips & Co., 2750 Poplar Street, Detroit 8, under the title "Arc Welding in the Maintenance and Construction of Tools and Dies." Ten types of electrodes are described, and range of application of each is explained. Photomicrographs show grain structures in the as-welded and heat treated conditions, and tempering curves indicate hardness ranges obtainable by heat treatment. Illustrations are shown of typical applications.

BRIQUETTED ALLOYS — A recent pamphlet issued by the Ohio Ferro-Alloys Corp., Canton, O., describes the application of that company's newly developed silicon, manganese, and chrome briquets used in making alloy additions to the cupola. Several pages are devoted to actual production results obtained in different foundries using these materials, including microphotographs of regular and briquetted charges.

DUST COLLECTORS—A new catalog completely describing its dust collectors, spray booths, metal parts washers, ovens and other sheet metal equipment has been issued by the Newcomb-Detroit Co., 5741 Russell Street, Detroit 11. The catalog is fully illustrated including cutaway drawings of equipment mechanism and size and capacity charts. The book also includes a 36-page engineering data section containing useful information engineers working with sheet metal.

ELECTRONIC CONTROL—Fundamentals and various applications of electronic control are described in a 12-page bulletin (GEA 4126) issued by the General Electric Co., Schenectady, N. Y. Well illustrated, the publication describes many practical applications including rectification, resistance welding, timing, processing, photoelectric installations involving counting, sorting, weighing, measuring, registering, illumination and control of cement kiln temperatures.

DIESEL LOCOMOTIVE—An attractive and exceptionally well illustrated booklet issued by the General Electric Co., Schenectady, N. Y., describes the constructional features, operation and economical features of a 50-ton diesel-electric locomotive, a standard unit for quick delivery. This 300-horsepower 2-axle locomotive is designed specifically for use in industrial plants where loads are heavy, high speed unnecessary, and clearances are close.

FURNACES—"Melting, Alloying, Heating Aluminum and Alloy Ingot, an original paper appearing in *Metal Progress*, August, 1943, has been reprinted and now is circulated by Dempsey Industrial Furnace Corp., Springfield, Mass. The paper covers melting, reverberatory furnace design, fuels, alloying and cleaning the bath, hardeners, casting technique, book molds, direct casting, continuous casting, operating precautions, homogenizing the ingots, preheating, cladding, annealing.

SUPERHEAT BURNERS—"Selas Superheat Burners, High Speed Concentrated Heat Sources Fueled With Gas and Air Only" is the title of a new 8-page catalog, issued by the Selas Co., Erie Avenue, and D Street, Philadelphia, to introduce equipment for flame hardening, flame annealing, mechanized brazing, preheating and other localized open heat treatments. Diagrams explain special modifications of burners for particular jobs, also automatic machine tools for heat treatment designed around the new air-gas combustion technique.

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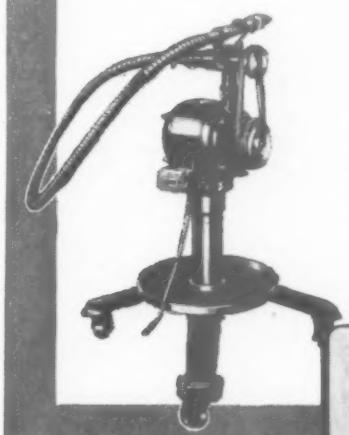

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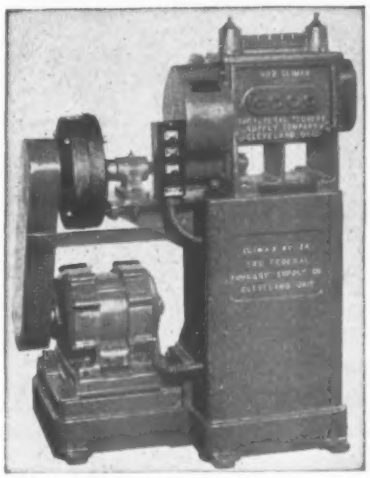

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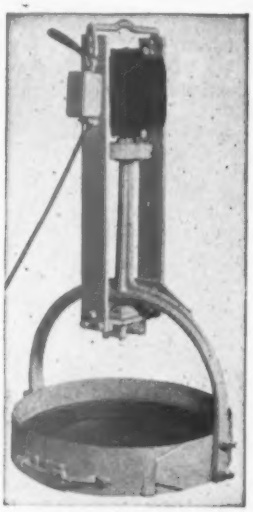

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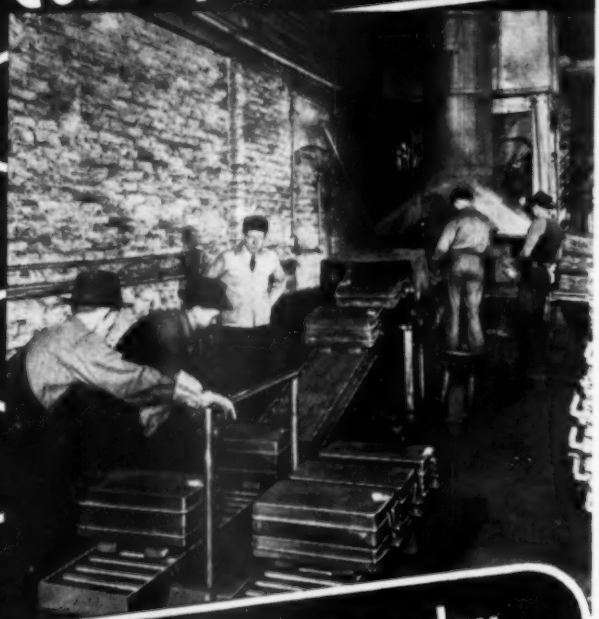

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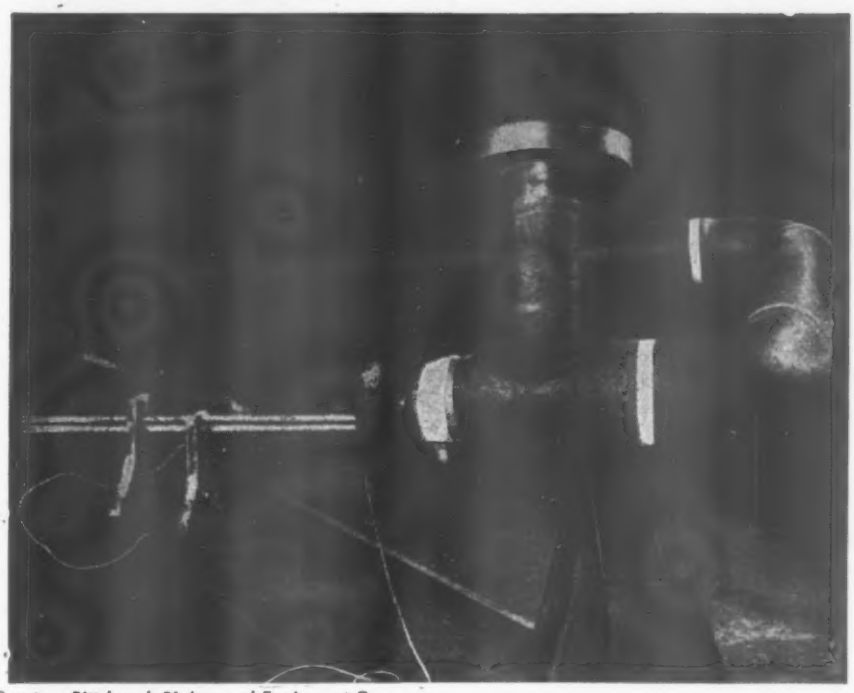

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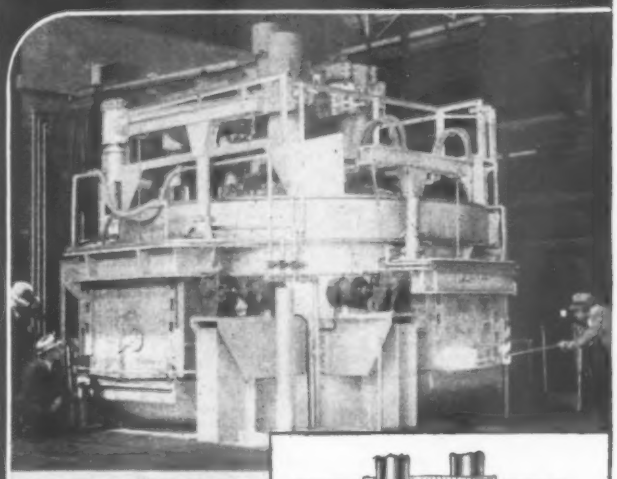

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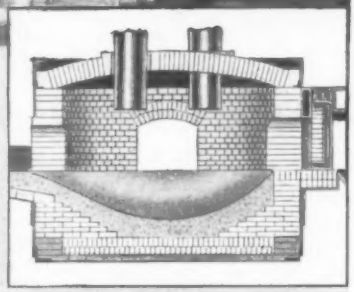

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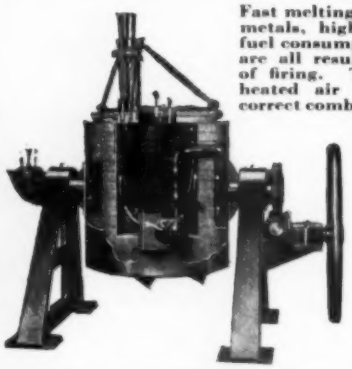

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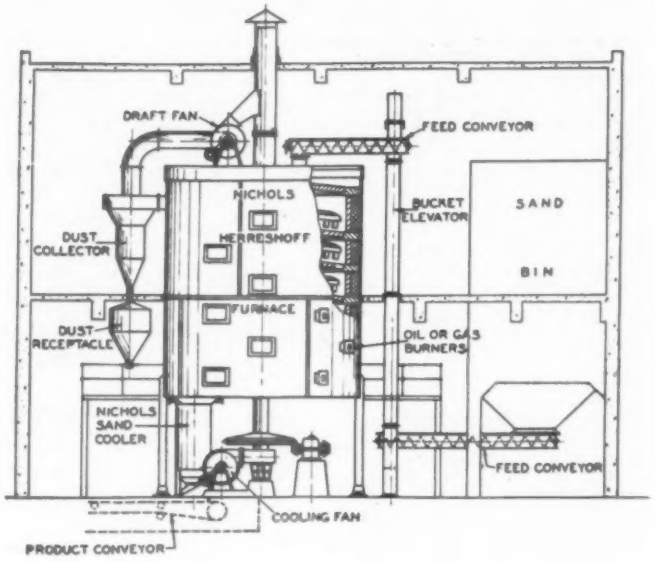

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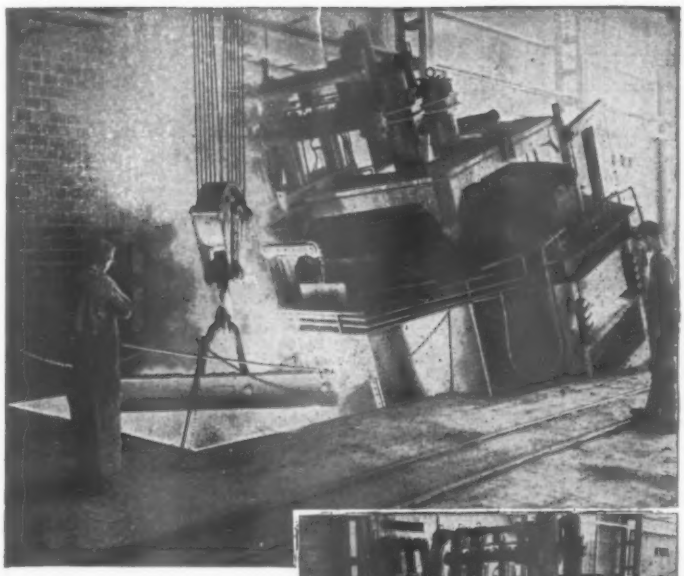

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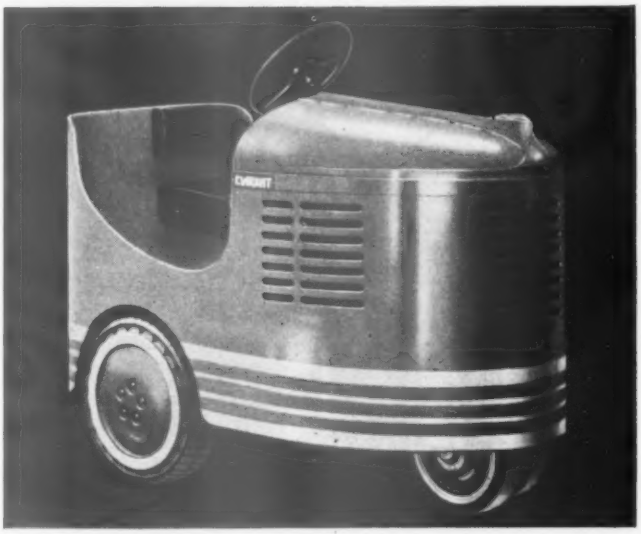

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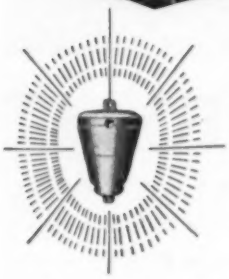

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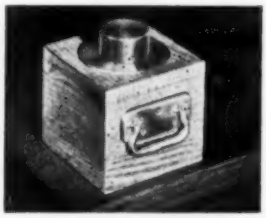

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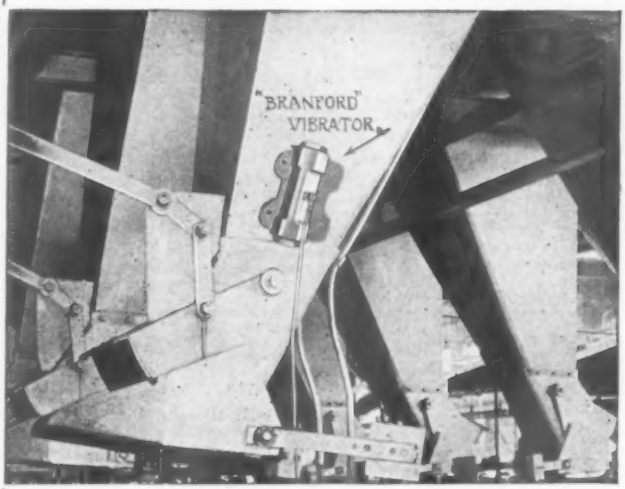

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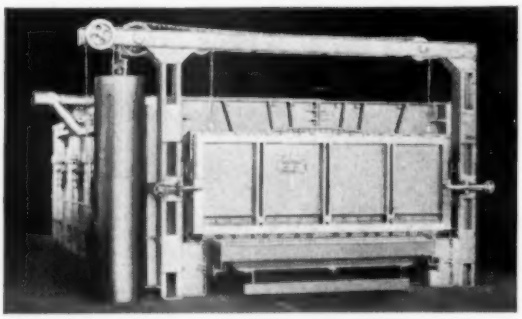

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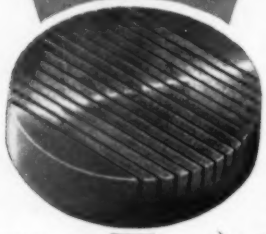

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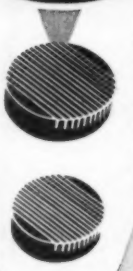

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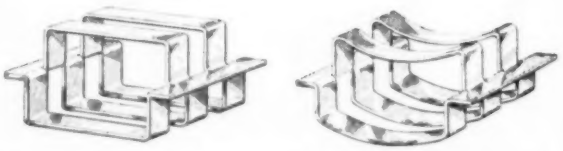

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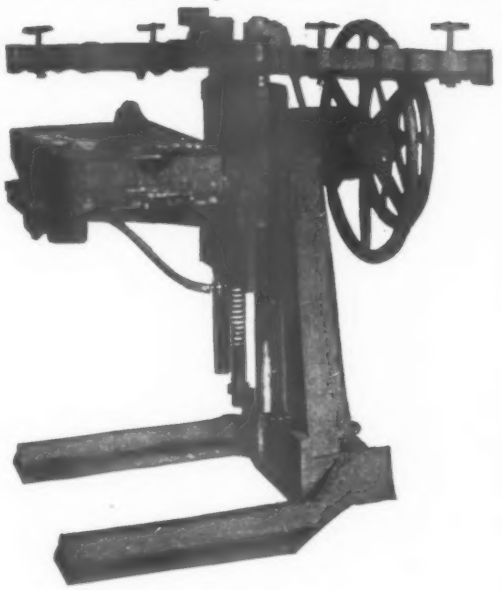

The machine illustrated is the Model C-414 in pattern drawn position. Capacity of flasks 36 x 46. This machine is being widely used for the accelerated magnesium castings production.

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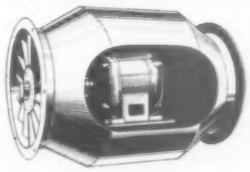

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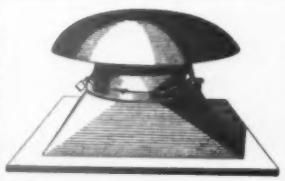

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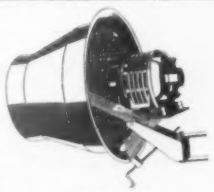

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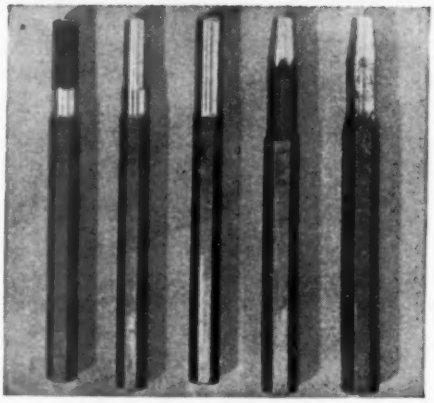

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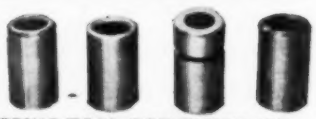

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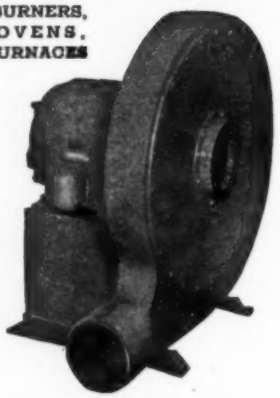

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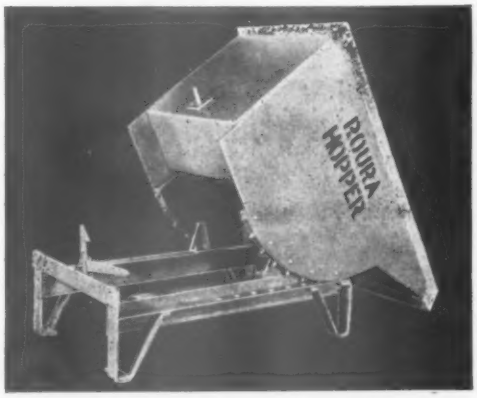

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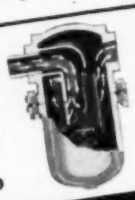

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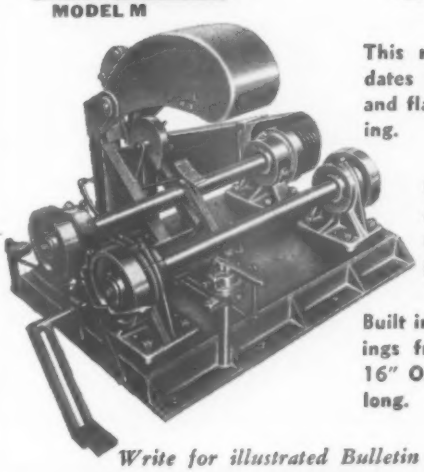

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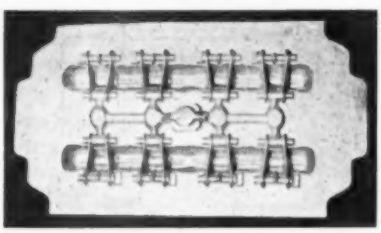

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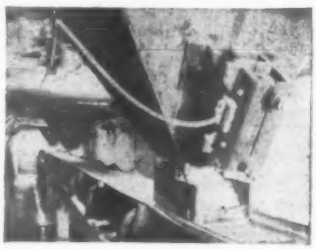

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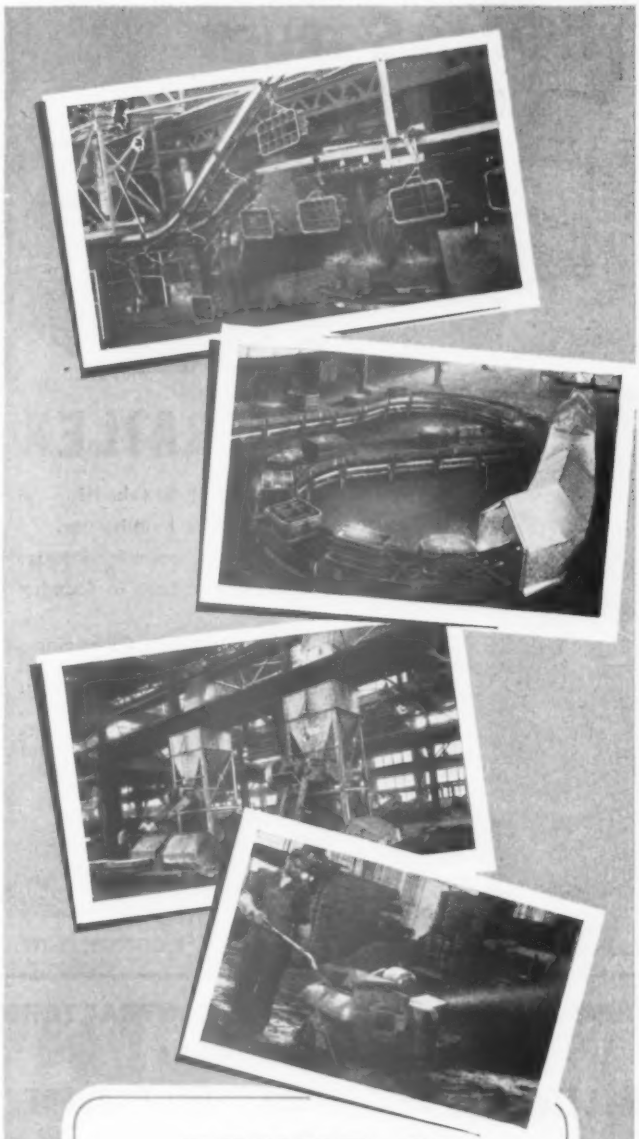

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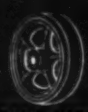

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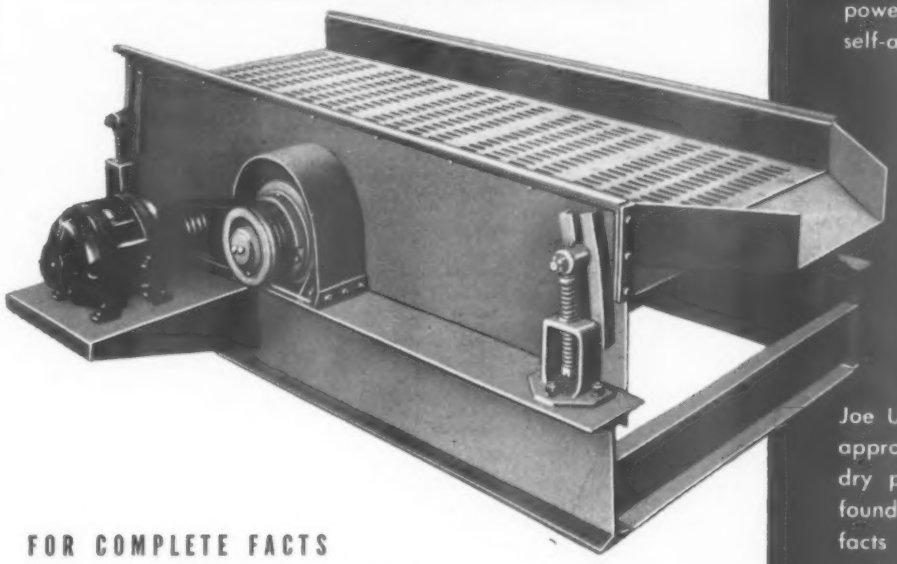

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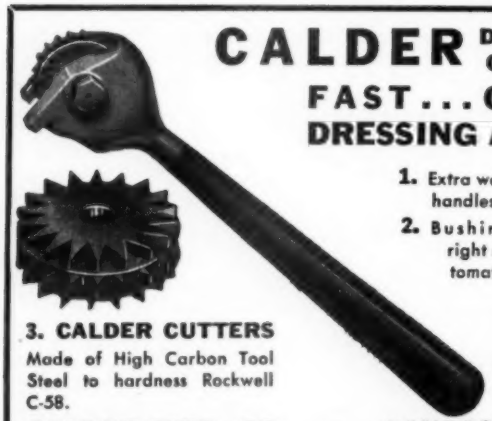

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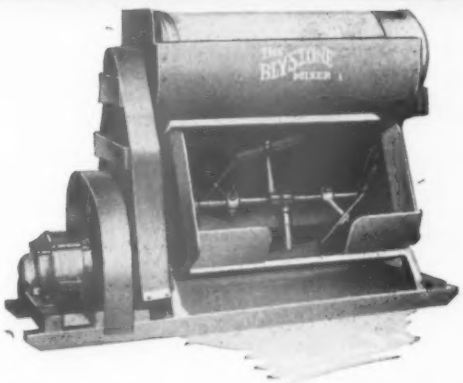

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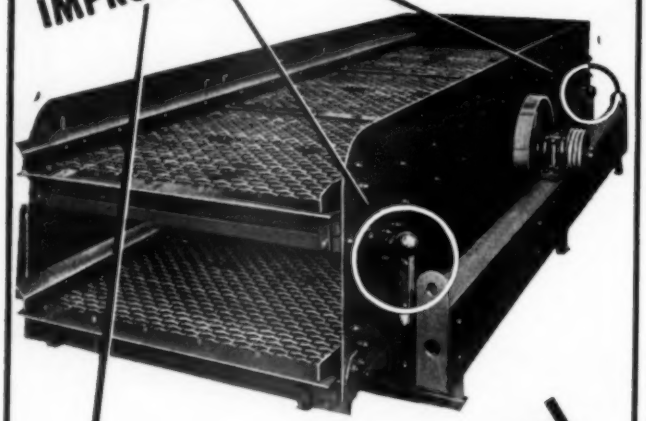

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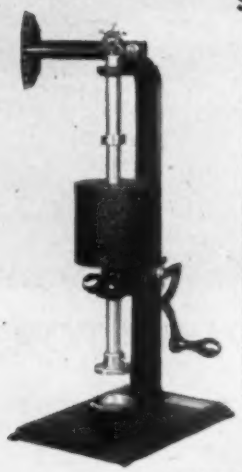

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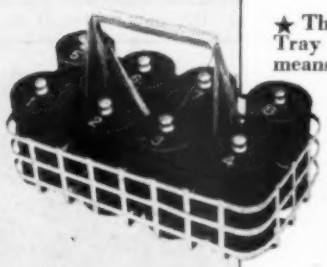

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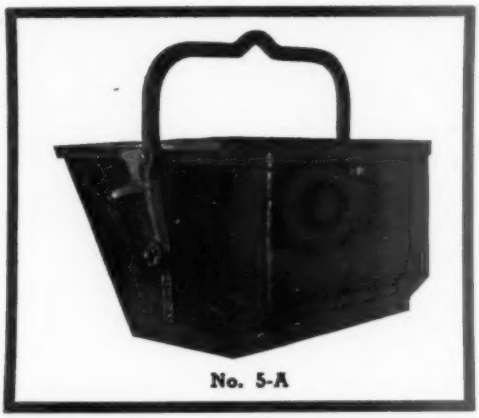

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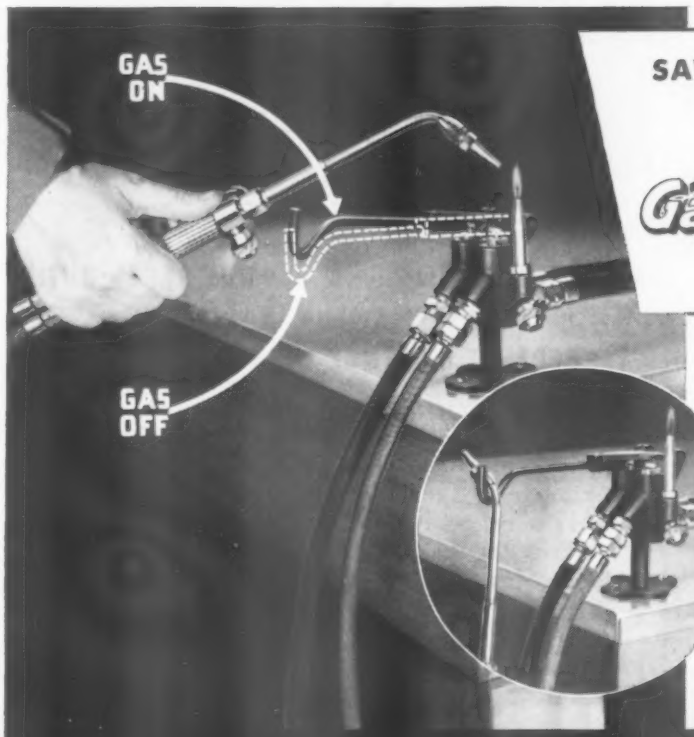

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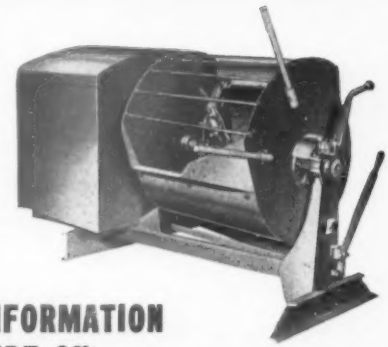

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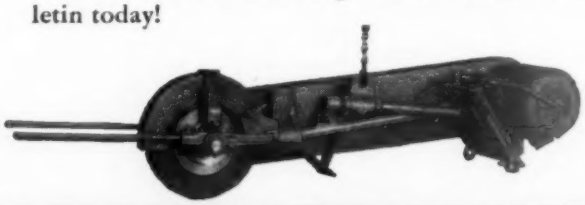

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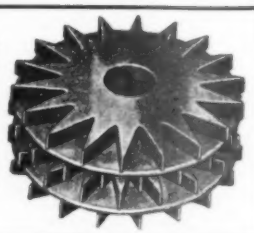

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Wanted immediately for postwar work. Familiarity with railroad equipment and steel casting design desirable. Give age, outline of training and experience, salary expected and when available in reply. Address: Box 506, The FOUNDRY, Cleveland 13, Ohio.

ENGINEER (Designing)
A Mechanical Engineer with foundry experience to create, completely design and supervise experimental work of molding machines and other foundry equipment. Address: Box 448, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

NONFERROUS FOUNDRY SUPERINTENDENT or FOREMAN
Wishes position with post war possibilities. Technically trained and background of 23 years foundry work. Well versed in all phases of the business, both dry and green sand work. Can furnish references. Address: Box 492, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN
With thirty years' practical experience as a molder and foreman in light, medium and heavy castings, steel and gray iron. Age 47. Prefer Coast. Address Box 484, The FOUNDRY, Cleveland 13, Ohio.

STOVE PLATE FOUNDRY SUPERINTENDENT
Desires position with a well established stove concern. Available June 1, 1944. Excellent past record—coremaking—pricing—handling personnel and general foundry practice. Address: Box 458, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE-METALLURGIST
Twenty-five years' experience in light and medium gray iron and alloys. Technical and practical training. Excellent record and references. Specializing in organizing for production at lowest costs. Age 50. Interested in position where complete responsibility is required. Address: Box 133, The FOUNDRY, Cleveland 13, Ohio.

PLANT MANAGER OR SUPERINTENDENT
Mechanical Engineer, middle age, proven ability in top management. Familiar with modern foundry equipment and methods. Can handle all details connected with ferrous and nonferrous work. Desire to change to position with definite postwar future. Locate anywhere. Address: Box 462, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRYMAN
With many successful years at the trade, who has built two large foundries in the past twelve years and who did all the selling as well as managing, would like to connect with large firm selling metals and alloys as foundry engineer and salesman or to connect with large nonferrous foundry selling castings and to help build up their business. Middle aged and healthy. Will go anywhere. Best of references. Address: Box 486, The FOUNDRY, Cleveland 13, Ohio.

PLANT MANAGER
Twenty years' experience in grey iron. Have excellent qualifications. Held top positions. Understand costs, budgets, production control and shop practice. Married and draft exempt. Address: Box 304, The FOUNDRY, Cleveland 13, Ohio.

CHIEF METALLURGIST—CHEMIST
Fourteen years' experience, practical and technical control. Twelve years complete charge in electric steel foundry. Acid and basic practice—alloys and carbon steels. Background of chemical engineering. Age 39. Available. Address: Box 508, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER
MATURE, CAPABLE, DEPENDABLE
With a record that assures you that he can manage your business energetically and safely and develop its possibilities fully and profitable. Excellent experience foundry, machinery and allied lines. General management established medium-size business primary objective. Correspondence in confidence. Address: Box 509, The FOUNDRY, Cleveland 13, Ohio.

COREMAKER FOREMAN
Experienced on production of all types of cores for heavy or light castings, iron, steel, bronze or magnesium. Diesel engines, air compressors, machine tool, jobbing work. Able to handle any core production job successfully. Services available at once. Address: Box 491, The FOUNDRY, Cleveland 13, Ohio.

TO EXECUTIVES OF STEEL FOUNDRIES PRODUCING SMALL & MEDIUM CASTINGS
If you are looking for a young and aggressive Plant Manager or Superintendent I would like to present my qualifications. Address: Box 500, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT
Fully experienced in nonferrous metals—light, medium and heavy castings. Rigging, gating, cost estimating, blue print reading and core room production. Neat appearing and aggressive. Age 42. Thorough experience as foundry superintendent. Experience including steam valve high pressure casting aluminum, brass bronze, nickel, copper, aluminum bronze, silicon bronze and high manganese bronze casting. Employed. Address: Box 286, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRYMAN
Thirty years' experience in handling foundries in all classes of work—both heavy and light. Good rigger for production. Best of references. Address: Box 493, The FOUNDRY, Cleveland 13, Ohio.

MANAGING EXECUTIVE
OF STEEL FOUNDRY. AVAILABLE. ADDRESS: BOX 373, The FOUNDRY, CLEVELAND 13, OHIO.

NONFERROUS FOUNDRY SUPERINTENDENT OR MANAGER
Practical man. Well versed in all branches of the trade, jobbing and production. Large and small castings, green or dry work. Can figure and estimate from blue prints. Authority on metals and practice. 43 years old, married, good character wishes to make connection with company with a future. East Coast Metropolitan area preferred. Address: Box 474, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT
Nineteen years of executive charge of molding, core room, cleaning department, and office in jobbing shop, casting semi-steel and grey iron castings. Best of references. Address: Box 446, The FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS
This advertising service of 34 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.
R. W. BIXBY INC.
101 Delward Bldg. Buffalo, N. Y.

GRAY IRON FOUNDRY EMPLOYMENT
We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.
Gray Iron Founders' Society Inc.
1010 Public Square Building Cleveland, Ohio

Wanted-To-Buy

MIXERS WANTED
Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED
Used cupola charger suitable for 48" cupola—also yard crane, 5 ton, 40' to 60' span. Address: Box 502, The FOUNDRY, Cleveland 13, Ohio.

WANTED
Used electric furnace, three phase, top charging 1000 to 2000 lb. Nominal capacity with or without transformers. Address: Box 495, The FOUNDRY, Cleveland 13, Ohio.

WANTED
Tumbling Barrel, Size, Conditions, Price. Address: Box 487, The FOUNDRY, Cleveland 13, Ohio.

WANTED
American Foundry Equipment Sandcutter Model A. M. Address: Box 1124, Syracuse, N. Y.

Foundries For Sale

FOR SALE
In West Coast area, well equipped nonferrous Foundry and wood and metal Pattern Shop. Accommodates 35 or more employees. Doing excellent business, established over 24 years. Owner wants to retire. Approximate price $100,000.00. Address: Box 424, The FOUNDRY, Cleveland 13, Ohio.

Foundry—iron. Small town, Akron area. Complete foundry employing six. Can increase. Excellent for two. Fully equipped. 5 ton cupola. Ample work. Rent $50. Price including $5000 inventory, $9000. **APPLE COMPANY BROKERS, CLEVELAND, OHIO.**

For Sale

Leeds & Northrup Milliammeter Optical Pyrometer. In good condition. Ranges 1400 to 2500° F.—2200 to 3200° F. Price $125. Address: Box 494, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

For Sale

REBUILT EQUIPMENT IN STOCK
IMMEDIATE SHIPMENT

(1)—3-ton geared crane type Ladle.
(2)—¾" cap. Power Sprue Cutters.
(1)—10" Tabor Post Type Squeezer.

ELECTRIC MONORAIL HOISTS

(2)—1-ton Shepard, 230-VDC., 1-motor.
(2)—1-ton Euclid, 115/230-VDC., 1-motor.
(1)—1-ton Cleveland Tram, 230-VDC., 2-motor.
(1)—2-ton Shepard, 230-VDC., 1-motor.
(1)—2-ton Shepard, 230-VDC., 2-motor.
SPECIAL: 2—1-ton Shepard Hoists arranged for stationary mounting, 7½-HP. motor, 220/440-VAC., Var. Speed, separate controller, cap. 32-ft. of cable, suitable for use as winches, car puller, to operate furnace doors or elevator.
SPECIAL: 2—7½-ton Shepards fl. or cage operated, 230-VDC., 20-HP. hoist motor, 28/70-FPM., 10-HP. trolley motor, 350/400-FPM., 40-ft. lift.

AIR COMPRESSOR

(1)—9x8 Chicago Pneumatic HSB cap. 178 CFM C 100 lb. pressure complete with 25 H.P. motor and control.

BUCKETS

(1)—¾-yd. 2-line Browning type Z-½.
(1)—¾-yd. Hayward Electric 220-VAC.
(2)—1½-yard Hayward Electric 230-VDC.
(1)—2-yd. Hayward Electric 230-VDC.

OVERHEAD ELECTRIC TRAVELING CRANES

(1)—3-ton Shaw, 30'0" span, 230-VDC., FL. or CG. OP.
(1)—2- to 5-ton, 30'11" span, A.C. or D.C., FL. OP. with 1 or 2-motor, 2 to 5-ton hoist.
(1)—5-ton P & H, 54'1½" span, 3-motors, 230-VDC. CG. OP.
(1)—20-ton Bedford, 5-ton Aux. H. 230-VDC., 50'0" span, CG. OP.
SPECIAL: 3—5-ton JIB Cranes, masts 23'8", Boom 19'2", Rebuilt, wired with 1 to 5-ton A.C. or D.C. Electric Hoists.

WE OWN AND HAVE ALL THIS EQUIPMENT IN STOCK. IT IS OFFERED REBUILT IN OUR LARGE MODERN PLANT AND FULLY GUARANTEED.

T. B. MacCABE CO. 4304 CLARISSA ST.
PHILADELPHIA (40) PENNA.

FOR SALE

Practically new 2500 KVA Furnace Transformer for 22000 to 26000 volt primary; can be furnished with 8 ft. or 9 ft. diam. new shell. One V-5½ shell with 600 KVA of transformer capacity for 6600, 11,000 or 13,200 volt 3 phase. Buck-Stay and Rocker Structure and Transformers for 12 x 40 ft. bath tilting hearth furnace for reduction of iron ore.

GREENE ELECTRIC FURNACE CO.
2702 6th South SEATTLE 4, WASH.

REBUILT
BLOWERS—FANS—EXHAUSTERS

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder end dust exhausters. Ventilating fans.

GENERAL BLOWER COMPANY
404 N. Peoria St. Chicago, Ill.

FOR SALE

1—3-ton Geared Ladle.
1—8-ton Geared Ladle.
1—Whiting Standard Mixing Ladle 18" radius x 64" long—excellent condition.

BAKER PERKINS INC.
Saginaw -:- Michigan

FOR SALE

20 ton ladle worm and gear type, geared both sides. Address: Builders Iron Foundry, Providence 1, R. I.

FOR SALE

125 roll up flasks, 23" square, 6" cope and 4" drag with bottom boards. All practically new. Address: Albert Lea Foundry Co., Albert Lea, Minn.

FOR SALE

Model 50 Beardsley & Piper Sand Mullor. Now in operation. Address: The Elyria Foundry, Elyria, Ohio.

FOR SALE—ALL NEW

1—Pyro Optical Pyrometer $220.00
1—42 x 6" Medart Wood Split Pulley $18.00
1—5 x 7 x 1⅛" Rockwood Pulley $4.00
3—20 x 2½" x 1½" Grit T16 Carborundum wheels—each $25.00

ADDRESS: CHARLES L. CRABB, 1227 W. HENDERSON ST., CHICAGO 13, ILL.

AIR COMPRESSORS

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.
ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1302 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

STEEL TANKS

9—5000 gal., 11,500 and 18,000 gal. cap.
17—1000 bbl., 4000 bbl. and 10,000 bbl. cap.

TANKS BOUGHT AND SOLD

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y

COMPRESSORS AND BLOWERS

2100 cfm @ 12 oz. Gen. Elec. Centrifugal compressor with 10 HP 2-60-3450 RPM motor.
2—1200 cfm @ 11 oz. Buffalo Pressure Blowers, 9½" intake 7" x 7⅛" outlet, with 7½ HP 3-60-1800 RPM motors.

SAND VIBRATOR

7 to 8 ton per hours, Jeffery-Traylor with vibrator M.G. set. Write, wire or phone.

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE., CLEVELAND 14, OHIO

FOR SALE

One 36" square by 5' long Tumbling Mill—¾" Plate Sides and 1" Plate Ends. Has been completely rebuilt and is in first class condition. Address: PREMIER FURNACE COMPANY, DOWAGIAC, MICH.

FOR SALE

2—Type "G" International roll-over machines, 20 x 48, long model.
7—Type "R" International hand roll, hand jolt, hand draw, all sizes.
1—Type "JS" 4 International jolt squeezer, portable.
3—Pridmore hand ram, hand roll, foot draw, roll-over machines.
1—Pridmore roll-over 48" x 60", 14" draw.
1—Davenport stripper 40" wide, 14" draw.
1—Davenport 22 jolt roll-over.
1—Tabor jolt squeezer.
1—Tabor plain bumper, 5' square table.
Tabor jolt strippers.
6—J-75 Osborn jolt squeezers, portable.
1—No. 175 Osborn jolt squeeze strip, portable.
1—No. 401 Osborn jolt roll-over.
1—No. 405 Osborn Jolt roll-over.
1—Nichols jolt strip squeezer.
Nichols jolt squeezers.
3—Milwaukee jolt squeezers.
1—Plain bumper, 18" x 24" table.
1—Otis Elevator 2000 lb. capacity, 5 H motor.
3—20" Coombs Electric Riddles.
1—24" Coombs Electric Riddle.
1—Gas fired ladle dryer, 10 burners.
2—Ladle Dryers, one for oil, one for gas.
1—Lockwood Tier Lift Electric Battery Truck, 1 ton lift capacity.
Lift trucks, all sizes with iron wheels or rubber tires.
26—Riveted Steel Skids.
1—Double End Grinder, 16" wheels, 37" between wheels, motor driven.
1—Double End Grinder, direct drive, motor driven.
1—Foxboro Blast Regulator, practically new.
1—Buffalo Blower and motor, direct drive with 2—H motor practically new.
1—New Haven PD Sand Blast Barrel.
High speed motor and blower for brass furnaces, several different sizes.
1—Ingersoll-Rand 6 x 4 Air Compressor, motor and tank.
1—Curtis 6 x 6 Air Compressor, upright, motor and tank.
1—Tessemer Sprue Cutter.
1—20" Exhaust Fan, motor driven, direct drive, practically new.
1—24" x 48" tumbling mill, 1" shell.
1—36" x 60" tumbling mill, 1" shell.
1—42" x 42" x 62" square mill, ¾" shell, friction clutch.
Tumbling mills of all sizes, plain and roller bearing.
1—Whiting 1½ ton tea-pot lip latest style pouring Ladle.
1—Whiting pit furnace, coke fired, never used.
1—1½ Ton Euclid Electric Hoist, hook on with trolley.
4—2 Ton Detroit Cable Air Hoists.
8—No. 100 Ross-Tacony Crucibles, never used.
1—No. 1 Whiting Cupola, never used.
1—No. 2 Climax Wire Cutter, never used.
2—Lift Trucks, new rubber tires on wheels.
1—Sly Dust Arrestor, new bags.
Blystone Sand Mixers, 5 and 7 cu. ft. capacity.
1—No. 1 Demmler Core Blower
2—Herman roll-over machines, 26" x 36" table
1—Tabor Pin Strip machine 32" x 32" table

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 LAKE ST. KALAMAZOO 21, MICH.

For Sale

SPECIAL DEFENSE BARGAINS

Cast Iron and Steel Plate Mill-Dust & Shavings Exhausters 50 in stock. **Cupola and Furnace** Blowers for Coke, Oil or Gas Combustion.
1—Spencer blower 3600 CFM @ 1½ lbs.—40 h.p. motor, and blast gate. 3/60/220 or 440.
1—Spencer Blower 2250 C.F.M.—1½ lbs.—25 H.P. 3/60/220 or 440 AC.
2—Sprague 4 Ton Electric Hoists 115 V. D.C.
1—US Rotary No. 3—Melting or Smelting.
1—Pair Monarch-Rockwell's—Rotating, each 500 lbs. cap. mounted together on base, oil burners available, when used together waste heat from one preheats other.
1—Hausfeld open flame, non crucible 400 lbs. brass capacity or equivalent volume for Aluminum.
1—Stationary for No. 70 crucible.
1—Schwartz, size 42" class A—for oil fuel.
Tumbling Mills—2 cast iron for brass cleaning.
1—Sly 48" x 60"—1" thick round steel shell.
2—36" dia. x 60" round steel shell.
Core Ovens:
1—"Buckeye" portable semicircular style 5 shelves.
1—Core Sand Mixer, Triumph make (dough mixer type) approx. 4 cu. ft. cap. 3—H.P. motor geared direct, 3/60/220 A.C.
Molding Machines:
1—Battenfeld stationary 17" x 22" platen—jolt-squeeze.
2—Osborn Portable No. 75-J.
2—Osborn Portable No. 76 air squeeze only.
1—Arcade portable or stationary plain air squeeze.
1—Stationary 12 x 18" small jolt table for cores.
1—Tabor jolt Table No. B-18 54" x 96".
1—Jolt Table 12" cyl. 40" x 60" table.
1—Osborn No. 405 stationary jolt-rollover draw.
1—International 26" x 36" type F jolt-rollover-draw.
Compressors:
1—Chicago 7½" x 6" 106' capacity, 100 lbs.
1—Chicago 12" x 8" 240' cap., 70 lbs.
1—Worthington Feather Valve 150' cap., 100 lbs.
1—Chicago—6" x 6"—50' cap.
1—Worthington 2 stage 450' cap.
Gardner 4½" x 4½" Vertical 19'.
Tested-air receivers—12" up to 36" dia.

CLIFTON MACHINERY CO.
1023 W. 6TH. CINCINNATI 3, OHIO

REBUILT USED EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 Lake St. Kalamazoo 21, Mich.

FOR SALE

One Iron Foundry Cupola lined to 42" complete with Connersville positive pressure blower and wind pipe. One Scrap Elevator (All Steel) Motor Driven, complete with Motor. Will sell as a Unit or separately. Address: Dedman Foundry & Machine Co., 415 N. St. Charles St., Houston, Texas.

FOR SALE

1—No. 2 Jolt Stripper, Johnson & Jennings, Table 24 x 30, high lift machine. Machine only used for a short time. Address: Box 501, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

WELDING, CUTTING EQUIPMENT. Torches, Regulators & Gauges, Aircraft Welding Outfits and Torches, Lead Welding Outfits and Torches, Soldering Outfits, Acetylene Generators, Supplies, Electric Arc Welders, Electrodes.

SUPERIOR OXY-ACETYLENE CO.
HAMILTON, OHIO

FOR SALE

One large Tabor Abrasive Wheel, Cutting-Off Machine, used 4 months, substantial saving. Address: Ace Foundry Company, 1650 N. Kostner Ave., Chicago 39, Ill.

FOR SALE

One—Pangborn type G. F. Blast Cleaning Barrel, No. 2 D.M.D., including ½ H.P. motor, direct drive. Good condition, used approximately 150 hours. Price $400.00. Address: H. W. CLARK COMPANY, MATTOON, ILLINOIS.

FOR SALE

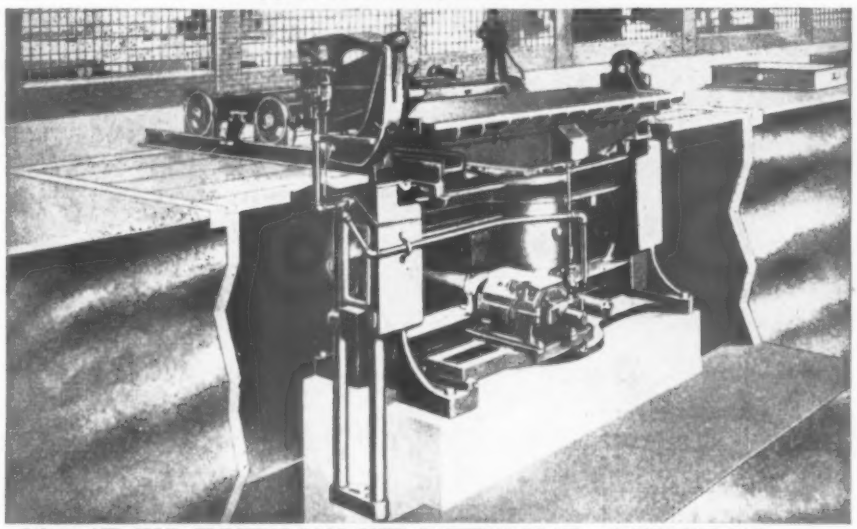
DETROIT ELECTRIC MELTING FURNACE
Type LFA 350
Complete with Transformers and all Accessories
Write for Specifications

GLOBE TRADING COMPANY
920 W. Lafayette Blvd. Detroit 26, Michigan

SCULLY Reconditioned Foundry Equipment

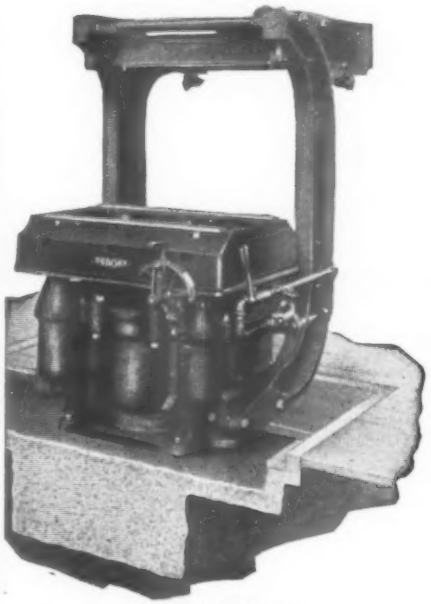
★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN, NEW MACHINE SHOP

OSBORN MOLDING MACHINE



Osborn AIR JOLT, ELECTRIC ROLL-OVER PATTERN DRAW and RUN-OUT CAR
No. 518-E 36 x 124" roll-over table, 36 x 112" jolter.

OSBORN JOLT SQUEEZE & POWER STRIP



No. 703 OSBORN
(Similar to above excepting with roll-off)
No. 703-6 Osborn jolt squeeze and strip, 21 x 28" table, stationary. Length of opening in lifting frame 34", 6" pattern draw, 8" cyl. dia. 1000 lbs. jolting cap. @ 80 lbs. press. Distance from lifting frame to squeeze head 24¼", flask length 44¼" with roll-off conveyor.
No. 703-5 Osborn, same as above, excepting 17 x 35" table.

No. 8 DEMMLER CORE BLOWER, open throat frame—stationary sand magazine—12" dia. opening at top, 17" core box clamping cyl.—with 12" max. draw—cyl. hydraulically controlled—with aux. exhaust valve, largest core will blow 30" long x 18" wide x 9" deep.

MISC. MOLDING MACHINES

No. 112 Arcade portable jolt roll-over and squeeze, pattern draw, table accommodates pattern plates up to 13 x 33"—9" draw, distance between uprights 36".

Arcade No. 10-040 jolt roll-over and squeeze, pit type, 44" distance between uprights, 20 x 34" jolt table, 7" jolt cyl., 18" draw, 42" distance head to swing table.

22" Tabor portable, jar roll-over and draw, 22 x 32" roll-over plate, 600 lbs. cap @ 80 lbs. pressure, 10" draw.

No. 22 Davenport, jolt roll-over draw, 20 x 30" table, 750 lbs. cap. @ 80 lbs. press., 10" draw.

No. 602 Osborn jolt roll-over draw, portable, 24 x 30" flask cap., 900 lbs. cap. @ 80 lbs. press., 10" draw.

No. 28 Davenport jolt roll-over draw, 26½ x 39½" table-pattern draw 12"—jolt cyl. dia. 8"—1500 lbs. cap. @ 80 lbs. press.

Pridmore 30 x 42" power turn-over and drop Electrically operated 24 x 32" jarring machine, 2 HP 220V AC Motor.

Herman Independent Turn-Over and Pattern Drawing Device, 40 x 50" roll-over, 40 x 56" bumper, 3000 lbs. jolting cap. 24" draw.

JOLT SQUEEZERS

No. 76 Arcade straddle portable type with swing-head, 17 x 20" table, 10" dia. cyl.

No. 75-J Osborn, portable, 36" between rods, 10" dia. cyl., 15 x 19" table.

No. "O" U. S. stationary swing-head 9" squeeze cyl., 15 x 21" table.

Adams 36" portable type, 12" dia. cyl. 16 x 22" table.

PLAIN JARRING MACHINES

60 x 60" Tabor, 14" dia. cyl., 8500 lbs. cap. @ 80 lbs. press.

42 x 60" Tabor, 13" dia. cyl., 7500 lbs. cap. @ 80 lbs. press.

Pangborn 6 ft. dia. TYPE EH-1 CABINET TABLE INSTALLATION, 5 ft. high partition, Abrasive Handling and Reclamation System, Belt and Bucket Type Elevator, Sandblast Pressure Tank.

AMERICAN SANDCUTTERS

Cleveland-American (similar to Model "K" 84" spiral cutting cyl., 36" dia., 92" between tractor wheels 5" face—equipped with Cleveland 3-phase 60 cycle 220V AC Motors, Cable and Take-Up Reel.

American Model "CP" size 72, having 72" cutting cyl., 90" between tractor wheels, tractor wheels 50" dia., 5" face, equipped with Hercules Gas Engine.

Royer Portable SAND SEPARATORS and BLENDERS

Royer Jr., cap. 150-200 lbs. sand per min. equipped with ½ HP single phase 110/220V AC Motor, pneu tire (wheelbarrow type).

Royer Model "C", cap. 450-550 lbs. sand per min., having iron wheels, equipped with 1½ HP Induction Motor 3/60/220V AC.

ELECTRIC BUCKETS

2-Yd. Hayward ELECTRIC COAL BUCKET, DC Electro Dynamic Motor, Hoist Cap. 8000 HP 230 V DC Motor.

1½-Yd. Hayward Electric equipped with 230V DC Electro Dynamic Motor, Hoist Cap. 8000 lbs.—Class "B" 6 HP.

1-Yd. Electric—equipped with DC Motor, dimension when closed 50" width, 72" length.

CORE TURN-OVER MACHINES

Pridmore Type "H" 22 x 18—8" drop, portable rock-over drop.

MISC. HAND ROLL-OVER MACHINES

International Type "R" 24 x 10" draw, portable, special core turn-over.

Tabor, portable, hand roll-over, hand draw, 1—16-18—8" draw, 1, as above, 20-22—8" draw.

Grimes Model A-112 hand rammed, roll-over, max. cap. inside of flask 20 x 42"—12" draw.

JOLT SQUEEZE STRIPPERS

No. 113 Milwaukee, open end type, portable, 500-lbs. cap. @ 80 lbs., 6" draw, 16 x 30" table.

Osborn No. 82 STRIPPING PLATE JOLT SQUEEZER, 46" between rods, 10" draw, 1200 lbs. jolting cap., 1000 lbs. stripping cap. 24 x 36" table, pin lifts 12" part one way, 36" the other.

Nicholls Type "D" stationary heavy duty JOLT SQUEEZE & PATTERN DRAW, squeeze piston 14" jolt piston 6", draw 2-6"—distance between strain rods 40" take approx. 15 x 24" flask.

JOLT STRIPPER

Herman, heavy duty type, will take flasks 42" long x 42" wide—3000 lbs. jolting cap. @ 90-100 lbs. press—can be arranged to handle flasks up to 45" x 70".

Osborn No. 550-22 pit type JOLT STRIPPER, stationary pin centers 16 x 32"—table 32 x 36".
Osborn No. 550, max. flask cap. 36" length 26" width, 16" pattern draw, 750 lb. jolting cap.

1000 lb.-2000 lb. DETROIT ELEC. FURNACES complete with Kuhlman 4000-Volt and Pittsburgh 4000V Transformers, switch-boards, extra electrodes, spare drums, etc.

SCULLY MACHINERY & EQUIPMENT CORP.

(Formerly - Foundry Division of Scully-Jones & Co.)

2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO 36, ILLINOIS

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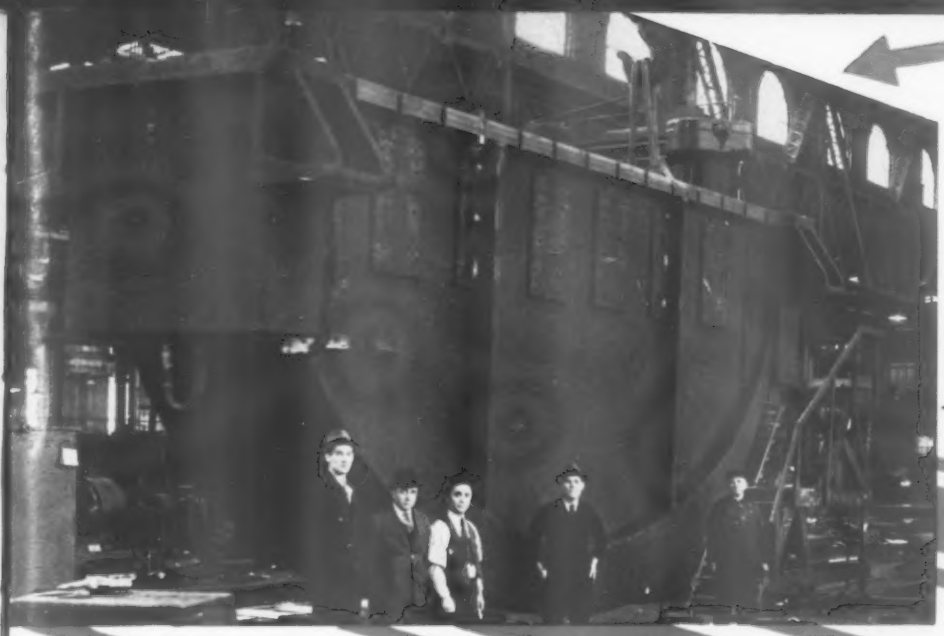

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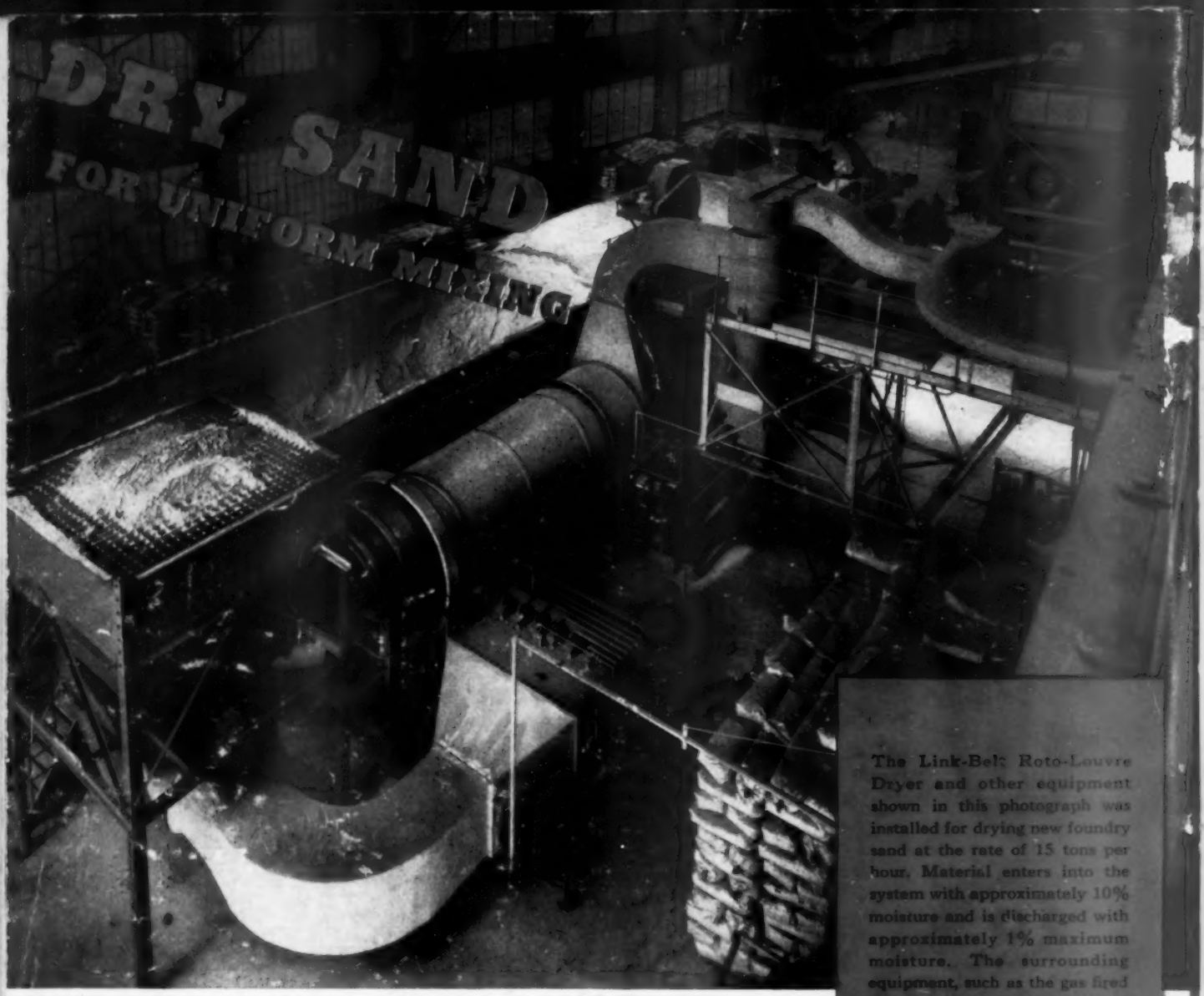

The Link-Belt Roto-Louvre Dryer and other equipment shown in this photograph was installed for drying new foundry sand at the rate of 15 tons per hour. Material enters into the system with approximately 10% moisture and is discharged with approximately 1% maximum moisture. The surrounding equipment, such as the gas fired furnace, dust collectors, fans and accessories are also shown. Sand discharged from the dryer is conveyed to the main system and delivered into bins located over the mixing equipment.

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